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IN THE

**Supreme Court of the United States**

OCTOBER TERM, 1977

No. 77- **77-1624**

PUBLIC SERVICE COMPANY OF NEW HAMPSHIRE,  
*Petitioner*

*v.*

SEACOAST ANTI-POLLUTION LEAGUE and  
AUDUBON SOCIETY OF NEW HAMPSHIRE,  
*Respondents*

**APPENDIX TO THE PETITION FOR  
A WRIT OF CERTIORARI  
TO THE UNITED STATES COURT OF APPEALS  
FOR THE FIRST CIRCUIT**

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**United States Court of Appeals  
for the First Circuit**

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No. 77-1284

SEACOAST ANTI-POLLUTION LEAGUE, et al.,

PETITIONERS,

v.

DOUGLAS M. COSTLE, as Administrator  
of the Environmental Protection Agency,

RESPONDENT,

PUBLIC SERVICE COMPANY of NEW HAMPSHIRE,

INTERVENOR.

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ON PETITION FOR REVIEW OF AN ORDER OF THE  
ENVIRONMENTAL PROTECTION AGENCY

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Before COFFIN, *Chief Judge*,  
CAMPBELL AND BOWNES, *Circuit Judges*.

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February 15, 1978

COFFIN, *Chief Judge*. This case is before us on a petition by the Seacoast Anti-Pollution League and the Audubon Society of New Hampshire (petitioners) to review a decision by the Administrator of the Environmental Protection Agency (EPA). We have jurisdiction under 33 U.S.C. § 1369(b)(1). The petition presents several important issues relating to the applicability and effect of the Administrative Procedure Act (APA), 5 U.S.C. §§ 501 *et seq.*, and the interpretation of the Federal Water Pollution Control Act of 1972 (FWPCA), 33 U.S.C. §§ 1251 *et seq.* In order to place those issues in context we set forth the procedural and factual background of the case.

The Public Service Company of New Hampshire (PSCO) filed an application with the EPA for permission to discharge heated water into the Hampton-Seabrook Estuary which runs into the Gulf of Maine. The water would be taken from the Gulf of Maine, be run through the condenser of PSCO's proposed nuclear steam electric generating station at Seabrook, and then be directly discharged back into the Gulf at a temperature 39°F higher than at intake. The water is needed to remove waste heat, some 16 billion BTU per hour, generated by the nuclear reactor but not converted into electrical energy by the turbine. Occasionally, in a process called backflushing, the water will be recirculated through the condenser, and discharged through the intake tunnel at a temperature of 120°F in order to kill whatever organisms may be living in the intake system.

Section 301(a) of the FWPCA, 33 U.S.C. § 1311(a), prohibits the discharge of any pollutant unless the discharger, the point source operator, has obtained an EPA permit. Heat is a pollutant. 33 U.S.C. § 1362(6). Section 301(b) directs the EPA to promulgate effluent limitations. The parties agree that the cooling system PSCO has proposed does not meet the EPA standards because PSCO

would utilize a once-through open cycle system — the water would not undergo any cooling process before being returned to the sea.<sup>1</sup> Therefore, in August, 1974, PSCO applied not only for a discharge permit under § 402 of the FWPCA, 33 U.S.C. § 1342, but also an exemption from the EPA standards pursuant to § 316 of the FWPCA, 33 U.S.C. § 1326. Under § 316(a) a point source operator who "after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator" that the EPA's standards are "more stringent than necessary to assure the protection [sic] and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water" may be allowed to meet a lower standard. Moreover, under § 316(b) the cooling water intake structure must "reflect the best technology available for minimizing adverse environmental impact."

In January, 1975, the Regional Administrator of the EPA held a non-adjudicatory hearing at Seabrook. He then authorized the once-through system in June, 1975. Later, in October, 1975, he specified the location of the intake structure. The Regional Administrator granted a request by petitioners that public adjudicative hearings on PSCO's application be held. These hearings were held in March and April, 1976, pursuant to the EPA's regulations establishing procedures for deciding applications for permits under § 402 of the FWPCA, 40 C.F.R. § 125.36. The hearings were before an administrative law judge who certified a record to the Regional Administrator for decision. The Regional Administrator decided in November, 1976, to reverse his original determinations and deny PSCO's application.

<sup>1</sup>The Fourth Circuit's remand of the EPA's regulations on this point does not disturb the parties' agreement. *Appalachian Power Co. v. Train*, 545 F.2d 1351 (4th Cir. 1976).



PSCO, pursuant to 40 C.F.R. § 125.36(n), appealed the decision to the Administrator who agreed to review it. Thereafter, a new Administrator was appointed, and he assembled a panel of six in-house advisors to assist in his technical review. This panel met between February 28 and March 3, 1977, and submitted a report finding that with one exception PSCO had met its burden of proof. With respect to that exception, the effect of backflushing, the Administrator asked PSCO to submit further information, offered other parties the opportunity to comment upon PSCO's submission, and stated that he would hold a hearing on the new information if any party so requested and could satisfy certain threshold conditions (set out below). Petitioners did request a hearing, but the Administrator denied the request.

The Administrator's final decision followed the technical panel's recommendations and, with the additional information submitted, reversed the Regional Administrator's decision, finding that PSCO had met its burden under § 316.<sup>2</sup> It is this decision that petitioners have brought before us for review.

#### *Applicability of the Administrative Procedure Act*

Petitioners assert that the proceedings by which the EPA decided this case contravened certain provisions of the APA governing adjudicatory hearings, 5 U.S.C. §§ 554, 556, and 557. Respondents answer that the APA does not apply to proceedings held pursuant to § 316 or § 402 of the FWPCA, 33 U.S.C. §§ 1326, 1342.<sup>3</sup>

<sup>2</sup> The EPA proceedings went forward concurrently with proceedings before the Nuclear Regulatory Commission. The NRC had not yet finished its review of PSCO's application for a construction permit for the Seabrook plant.

<sup>3</sup> There is some dispute as to whether this was a proceeding pursuant to § 316 or § 402 of the FWPCA. The substantive standards are drawn from § 316 which authorizes less stringent effluent limitations than would otherwise be imposed if the point source operator can still assure "the protection and propagation

The dispute centers on the meaning of the introductory phrases of § 554(a) of the APA:<sup>4</sup>

"This section applies . . . in every case of adjudication required by statute to be determined on the record after opportunity for an agency hearing . . . ." Both § 316(a) and § 402(a)(1) of the FWPCA provide for public hearings, but neither states that the hearing must be "on the record". We are now the third court of appeals to face this issue. The Ninth Circuit and the Seventh Circuit have each found that the APA does apply to proceedings pursuant to § 402. *Marathon Oil Co. v. EPA*, Nos. 75-3794 to 75-3796 (9th Cir., Nov. 21, 1977); *United States Steel Corp. v. Train*, 556 F.2d 822 (7th Cir. 1977). We agree.

At the outset we reject the position of intervenor PSCO that the precise words "on the record" must be used to trigger the APA. The Supreme Court has clearly rejected such an extreme reading even in the context of rule

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of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made." The EPA conducted the hearings by procedures analogous to the procedures for hearings on applications for permits under the National Pollutant Discharge Elimination System, § 402. We are of the opinion, however, that the distinction does not make any difference. Both sections direct the administrator to make his decision "after opportunity for public hearing", and the substantive character of the decision in each case is very similar. For convenience, we will refer to this as a § 316 proceeding.

<sup>4</sup> The determination that the EPA must make under § 316 of the FWPCA is not a rule because it is not "designed to implement, interpret, or prescribe law or policy". 5 U.S.C. § 551(4). Rather the EPA must decide a specific factual question already prescribed by statute. Since the determination is not a rule, it is an order. 5 U.S.C. § 551(6). The agency process for formulating an order is an adjudication. 5 U.S.C. § 551(7). Therefore, § 554 rather than § 553 of the APA is the relevant section. The same result is dictated because § 316(a) of the FWPCA is a licensing, 5 U.S.C. § 551(9), since it results in the granting or denial of a form of permission. See 5 U.S.C. § 551(8). A license is an order. 5 U.S.C. § 551(6).

making under § 553 of the APA.<sup>5</sup> See *United States v. Florida East Coast Ry. Co.*, 410 U.S. 224, 245 (1973); *United States v. Allegheny-Ludlum Steel Corp.*, 406 U.S. 742, 757 (1972). Rather, we think that the resolution of this issue turns on the substantive nature of the hearing Congress intended to provide.<sup>6</sup>

We begin with the nature of the decision at issue. The EPA Administrator must make specific factual findings about the effects of discharges from a specific point source. On the basis of these findings the Administrator must determine whether to grant a discharge permit to a specific applicant. Though general policy considerations may influence the decision, the decision will not make general policy. Only the rights of the specific applicant will be affected. "As the instant proceeding well demonstrates, the factual questions involved in the issuance of section 402 permits will frequently be sharply disputed. Adversarial hearings will be helpful, therefore, in guaranteeing both reasoned decisionmaking and meaningful judicial review. In summary, the proceedings below were conducted in order 'to adjudicate disputed facts in particular cases,' not 'for the purposes of promulgating policy-type rules or standards.'" *Marathon Oil Co.*, *supra*, slip op. at 2811.

<sup>5</sup> Our reasons for considering the words "on the record" more important in the context of rule making are set out below.

<sup>6</sup> Like the Ninth Circuit we consider it significant that § 509 of the FWPCA provides for judicial review of the EPA determination. The § 316 determination is reviewable under § 509(b)(1)(D) as a limitation under section 301, 302, or 306. Certainly that is an indication that the agency must be careful to provide some basis for appellate court review. But we are unable to agree that § 509, standing alone, satisfies an "on the record" requirement. But see *Marathon Oil Co.*, *supra*, slip op. at 2812. The APA, 5 U.S.C. § 706, makes it clear that in some cases review of agency action can be had though the action was not on the record. Section 509(b)(1) of the FWPCA does not specify what kind of review the court must undertake.

This is exactly the kind of quasi-judicial proceeding for which the adjudicatory procedures of the APA were intended. As the Supreme Court has said, "Determinations of questions of [the Administrative Procedure Act's] coverage may well be approached through consideration of its purposes as disclosed by its background." *Wong Yang Sung v. McGrath*, 339 U.S. 33, 36 (1950). One of the developments that prompted the APA was the "[m]ultiplication of federal administrative agencies and expansion of their functions to include adjudications which have serious impact on private rights." *Id.*, 339 U.S. at 36-37. This is just such an adjudication. The panoply of procedural protections provided by the APA is necessary not only to protect the rights of an applicant for less stringent pollutant discharge limits, but is also needed to protect the public for whose benefit the very strict limitations have been enacted. If determinations such as the one at issue here are not made on the record, then the fate of the Hampton-Seabrook Estuary could be decided on the basis of evidence that a court would never see or, what is worse, that a court could not be sure existed. We cannot believe that Congress would intend such a result.

Our holding does not render the opening phrases of § 554 of the APA meaningless. We are persuaded that their purpose was to exclude "governmental functions, such as the administration of loan programs, which traditionally have never been regarded as adjudicative in nature and as a rule have never been exercised through other than business procedures." Attorney General's Manual on the Administrative Procedure Act 40 (1947). Without some kind of limiting language, the broad sweep of the definition of "adjudication", defined principally as that which is not rule making, 5 U.S.C. § 551(6), (7), would include such ordinary procedures that do not require any kind of hearing at all. In short, we view the crucial part



of the limiting language to be the requirement of a statutorily imposed hearing. We are willing to presume that, unless a statute otherwise specifies, an adjudicatory hearing subject to judicial review must be on the record. The legislative history of the APA<sup>7</sup> and its treatment in the courts<sup>8</sup> bear us out.

This rationale and conclusion also are supported by our holding in *South Terminal Corp. v. EPA*, 504 F.2d 646, 660 (1st Cir. 1974) ("public hearing" not tantamount to "on the record"), and the other rule making cases cited to us for similar propositions.<sup>9</sup> The presumption in rule making cases is that formal, adjudicatory procedures are not necessary. A hearing serves a very different function in the rule making context. Witnesses may bring in new information or different points of view, but the agency's final decision need not reflect the public input. The witnesses are not the only source of the evidence on which

<sup>7</sup> For instance, one of the Senate documents explained the opening phrases of § 554 as follows:

"Limiting application of the sections to those cases in which statutes require a hearing is particularly significant, because thereby are excluded the great mass of administrative routine as well as pensions, claims, and a variety of similar matters in which Congress has usually intentionally or traditionally refrained from requiring an administrative hearing. Senate Comparative Print of June 1945, p. 7 (Sen. Doc. p. 22)." Attorney General's Manual, *supra*, 41.

We note that this document looks to whether or not an adjudicative hearing is provided, not to whether the hearing must be on the record. See also *Marathon Oil Co.*, *supra*, slip op. at 2812 and n.31.

<sup>8</sup> See, e.g., *Wong Yang Sung v. McGrath*, 339 U.S. 33, 50 (1950) (whether a hearing required by the Constitution triggers the APA); *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402 (1971) (whether in the context of the particular statute a hearing is designed to produce a record that is to be the basis of agency action).

<sup>9</sup> *United States v. Florida East Coast Ry.*, *supra*; *United States v. Allegheny-Ludlum Steel Corp.*, *supra*. The Supreme Court explicitly confined its holding to rule making cases. *Id.* 406 U.S. at 757.

the Administrator may base his factual findings. For these reasons, we place less importance on the absence of the words "on the record" in the adjudicatory context.

"It is believed that with respect to adjudication the specific statutory requirement of a hearing, without anything more, carries with it the further requirement of decision on the basis of the evidence adduced at the hearing. With respect to rule making, it was concluded, *supra*, that a statutory provision that rules be issued after a hearing, without more, should not be construed as requiring agency action 'on the record', but rather as merely requiring an opportunity for the expression of views. That conclusion was based on the legislative nature of rule making, from which it was inferred, unless a statute requires otherwise, that an agency hearing on proposed rules would be similar to a hearing before a legislative committee, with neither the legislature nor the agency being limited to the material adduced at the hearing. No such rationale applies to administrative adjudication. In fact, it is assumed that where a statute specifically provides for administrative adjudication (such as the suspension or revocation of a license) after opportunity for an agency hearing, *such specific requirement for a hearing ordinarily implies the further requirement of decision in accordance with evidence adduced at the hearing*. Of course, the foregoing discussion is inapplicable to any situation in which the legislative history or the context of the pertinent statute indicates a contrary congressional intent." Attorney General's Manual, *supra*, 42-43 (footnote and citation to statutory history omitted) (emphasis added).

Here the statute certainly does not indicate that the determination need *not* be on the record, and we find no indi-

cation of a contrary congressional intent.<sup>10</sup> Therefore, we will judge the proceedings below according to the standards set forth in §§ 554, 556, and 557 of the APA.<sup>11</sup>

<sup>10</sup> Congress refers to proceedings on the record several times in the FWPCA. On balance, we feel these references support our conclusion. The logical presumption that adjudications will be denied on the record unless otherwise specified whereas rule makings need not be unless so specified may help explain why Congress used the words "on the record" in some sections of the FWPCA but not others. In § 307(a)(2) where the phrase is used, the context is clearly rule making — making a list of pollutants. In § 310(c), 33 U.S.C. § 1320(c), the decision must be "[o]n the basis of the evidence presented". The hearing contemplated by this section results only in "recommendations" for abating international pollution and might well be thought to be a legislative type of hearing producing policy of general application.

Two subsections of § 507, 33 U.S.C. § 1367(b) and (e), state that the "hearing shall be of record and shall be subject to section 554 of title 5 of the United States Code." From these it is clear that Congress does not regard the reference to decision on the record as a talisman that triggers § 554 of the APA since in that case Congress would not have needed to add the explicit reference to the APA. Clearly Congress was motivated by concerns that the APA might not apply of its own force.

Finally, the phrase "on the record" appears in § 509(c) of the FWPCA, 33 U.S.C. § 1369(c), which allows a court to take additional evidence when review is sought pursuant to § 509(b) of determinations "required to be made on the record after notice and opportunity for hearing". Of the determinations listed in § 509(b), only one must be on the record by the terms of the FWPCA. That one is § 307(a)(2) which is clearly rule making. At least some of the rest are more likely adjudications, in which case they would presumptively be on the record. Moreover, as the Seventh Circuit has pointed out, it would be curious for Congress, if it thought that only § 307 of those sections enumerated in § 509(b) required a hearing on the record, to write § 509(c) the way it did. *United States Steel Corp. v. Train, supra*, 556 F.2d at 833. We think it clear that Congress assumed other hearings than just those pursuant to § 307 would have to be determined on the record.

<sup>11</sup> We agree with the Ninth Circuit that § 558(c) of the APA "does not independently provide that full adjudicatory hearings must be held" whenever an agency must pass on an application for a license. *Marathon Oil Co., supra*, slip op. at 2809, n. 25. But see *United States Steel Corp. v. Train, supra*, 556 F.2d at 833-34. We think the language of § 558(c) applies to whatever

### *Compliance with the Administrative Procedure Act*

Petitioners contend that two steps in the EPA's proceedings in this case violated the APA. We will look at each in turn.

#### 1. The Post-hearing Submissions; The Request for Information

The Regional Administrator, in his initial decision, had determined that the record was insufficient to properly evaluate the environmental effects of backflushing. The Administrator's technical panel agreed. The Administrator asked PSCO to submit supplemental information on that subject. Other parties were given permission to comment on PSCO's submission. In addition, the Administrator provided that a hearing with respect to the submission would be held if four conditions designed to guarantee that the hearing could resolve a substantial issue of fact were met.<sup>12</sup> PSCO submitted the requested informa-

kind of licensing proceeding the licensing statute has provided since it refers to "proceedings required to be conducted in accordance with sections 556 and 557 of [the APA] or other proceedings required by law". The most that can be said is that Congress assumed that most licensings would be governed by §§ 556 and 557.

<sup>12</sup> The four conditions were as follows:

1. There is a genuine and substantial issue of fact for resolution at a hearing. A hearing will not be granted on issues of policy or law.

2. The factual issue is capable of being resolved by available and specifically identified reliable evidence. A hearing will not be granted on the basis of mere allegations or denials or general descriptions of positions and contentions.

3. The data and information identified in the request for hearing, if established at a hearing, would be adequate to justify resolution of the factual issue in the way sought by the party. A hearing will be denied if, even assuming the truth and accuracy of all of the data and information submitted in support of the request for hearing, they are insufficient to justify the factual determination urged.

4. Resolution of the factual issue in the way sought by the person is adequate to justify the action requested. A hearing will not be granted on factual issues that are not determinative or controlling with respect to the action requested.



tion. Other parties, including petitioners, submitted comments, and petitioners requested a hearing. The Administrator denied the hearing because petitioners had failed to meet the threshold conditions.

Petitioners argue, first, that the Administrator could not rely on this information because it was not part of the exclusive record for decision. 5 U.S.C. § 556(e). Second, petitioners argue that even if the information was legitimately part of the record, the Administrator was obligated to provide an opportunity for cross-examination pursuant to 5 U.S.C. § 556(d).

Section 556(e) provides that "[t]he transcript of testimony and exhibits, together with all papers and requests filed in the proceeding, constitutes the exclusive record for decision . . . ." The first point to make about this section is that it does not limit the time frame during which any papers must be received. Certainly the submissions at issue were "filed in the proceeding". Moreover, 5 U.S.C. § 557(b) provides that "[o]n appeal from or review of the initial decision, the agency has all the powers which it would have in making the initial decision . . . ." One of those powers is the power to preside at the taking of evidence. 5 U.S.C. § 556(b)(1). For these reasons we can find no fault with the Administrator's decision to seek further evidence.<sup>13</sup> Indeed we think this procedure was a most appropriate way to gather the necessary information without the undue delay that would result from a remand.

The question remains, however, whether the procedures by which the Administrator gathered the information con-

<sup>13</sup> This holding implies a broad interpretation of 40 C.F.R. § 125.26(n)(12) which requires the Administrator to decide "matters under review on the basis of the record presented and any other consideration he deems relevant." In other words, as we state in the text, such other considerations may include expansions of the record, provided of course that the APA is complied with.

formed to the governing law. The first point is whether the Administrator was empowered to require that the new evidence be submitted in written form. The Administrator may, under 5 U.S.C. § 556(d), so require in cases of initial licensing. This is an initial licensing. *See* note 2, *supra*. But just as the APA does not impose procedures excused by a governing statute, so the APA does not excuse procedures compelled by the governing statute. In this case § 316(a) of the FWPCA requires the EPA to afford an opportunity for a *public hearing*. We do not believe that an opportunity to submit documents constitutes a public hearing.<sup>14</sup> Nor do we believe that the Administrator can comply with the statute merely by taking some evidence at a public hearing and then taking the rest in written form. If that were the law, nothing would prevent the Administrator from holding a ten minute hearing to establish compliance and then requiring the submission of the rest of the evidence. Therefore, we interpret the closing lines of § 556(d) of the APA to mean that the Administrator can require evidence to be submitted in written form in initial licensings unless the governing statute requires a public hearing.<sup>15</sup> The public hearing can be especially important in cases such as this one which turn not so much upon the actual baseline data (which presumably all parties will be happy to have submitted in written form) as upon experts' interpretation of the data. The experts' credibility is, therefore, very much at issue here. *See* Attorney General's Manual, *supra*, at 78.

While we believe that it was error for the Administrator

<sup>14</sup> We do not find, either in the FWPCA or federal law generally, a definition of the term "public hearing".

<sup>15</sup> We note that the definition of "license", 5 U.S.C. § 551(8), is very broad and includes many matters that do not require as much of an opportunity for public participation and oversight as does the granting of a permit to discharge pollutants into the sea.

not to hold a hearing to receive the responses to his request for Information, and that therefore the submission was not properly part of the record, we cannot be sure that any purpose would be served by ordering a hearing on this issue at this stage in these proceedings. Petitioners' principal complaints are that either the Administrator could not take any evidence or that he was required to afford an opportunity for cross-examination. The latter complaint has no more basis than the former. A party to an administrative adjudicatory hearing does not have an absolute right to cross-examine witnesses. The plain language of 5 U.S.C. § 556(d) limits that right to instances where cross-examination is "required for a full and true disclosure of the facts."

We will order a remand for the limited purpose of allowing the Administrator to determine whether cross-examination would be useful.<sup>16</sup> This remand is necessary because the Administrator's threshold conditions were designed to determine whether a hearing was necessary, not how that hearing should be conducted.<sup>17</sup> The parties' submissions likewise went to that somewhat distinct question. Ordinarily we might well overlook what appears to be a more theoretical than practical distinction, but we are influenced

<sup>16</sup> The APA commits the decision whether to allow cross-examination to the discretion of the person presiding at the hearing. 5 U.S.C. § 556(c)(5), (c)(7), and (d). See Attorney General's Manual, *supra*, at 78. The party seeking to cross-examine bears the burden of showing that cross-examination is in fact necessary. See *American Public Gas Ass'n. v. FPC*, 498 F.2d 718, 723 (D.C. Cir. 1974). Petitioners would place the burden of establishing the need for cross-examination on the same party bearing the burden of proof as to the substantive standards set by § 316 of the FWPCA. There is no merit in that argument, however. In this instance petitioners are the proponent of a procedural order and will properly bear the burden. Cf. 5 U.S.C. § 556(d).

<sup>17</sup> We do not mean to suggest that the conditions set by the Administrator might not serve this purpose as well, but we feel that all parties should have the opportunity to focus their arguments on the specific issue of the necessity of cross-examination.

here by the fact that a remand is necessary anyway for reasons discussed below. If the Administrator finds that cross-examination would help disclose the facts a hearing must be provided at which cross-examination would be available. If, however, the Administrator concludes that cross-examination would not serve any useful purpose then we will not require him to hold a hearing merely to have the already submitted statements read into the record<sup>18</sup>.

## 2. Participation of the Technical Review Panel

Petitioners object to the Administrator's use of a panel of EPA scientists to assist him in reviewing the Regional Administrator's initial decision. The objection is two-fold: first, that the Administrator should not have sought such help at all; and, second, that the panel's report (the Report) to the Administrator included information not in the administrative record.

Petitioners point out that by the EPA's own regulations "[t]he Administrator shall decide the matters under review on the basis of the record presented and any other consideration he deems relevant." 40 C.F.R. § 125.36(n)(12) (emphasis added). It is true that when a decision is committed to a particular individual that individual must be the one who reviews the evidence on which the decision is to be based. See *Morgan v. United States*, 298 U.S. 468, 481 (1936). But it does not follow that all other individuals are shut out of the decision process. That conclusion runs counter to the purposes of the administrative agencies which exist, in part, to enable government to focus broad ranges of talent on particular multi-dimensional problems. The Administrator is charged with making highly technical decisions in fields far beyond his individual expertise.

<sup>18</sup> Naturally, the Administrator's decision regarding the necessity of holding cross-examination will be subject to judicial review. 5 U.S.C. § 706(2)(A).



"The strength [of the administrative process] lies in staff work organized in such a way that the appropriate specialization is brought to bear upon each aspect of a single decision, the synthesis being provided by the men at the top." 2 K. Davis, *Administrative Law Treatise* 84 (1958). Therefore, "[e]vidence . . . may be sifted and analyzed by competent subordinates." *Morgan v. United States, supra*, at 481. Cf. 5 U.S.C. § 557(d) (forbidding *ex parte* communications only with persons outside the agency). The decision ultimately reached is no less the Administrator's simply because agency experts helped him to reach it.

A different question is presented, however, if the agency experts do not merely sift and analyze but also add to the evidence properly before the Administrator. The regulation quoted above cannot allow the Administrator to consider evidence barred from consideration by the APA, 5 U.S.C. § 556(e), "The transcript of testimony and exhibits, together with all papers and requests filed in the proceeding, constitutes the exclusive record for decision . . . ." To the extent the technical review panel's Report included information not in the record on which the Administrator relied,<sup>19</sup> §556(e) was violated.<sup>20</sup> In effect the agency's staff would have made up for PSCO's failure to carry its burden of proof.

Our review of the Report indicates that such violations

<sup>19</sup> The use of the extra-record evidence must substantially prejudice petitioners in order to constitute fatal error. *United States v. Pierce Auto Freight Lines*, 327 U.S. 515, 528-29 (1946); *Marathon Oil Co., supra*, at 2815; *NLRB v. Johnson*, 310 F.2d 550, 552 (6th Cir. 1962). The Administrator's reliance on extra-record evidence for important facts, we feel, makes out such prejudice.

<sup>20</sup> It is true that the Administrator stated that "I did not use the technical panel to supplement the record. The technical panel was instructed to, and did, base its recommendations on the record." Denial of Motion for Stay and Partial Grant of Motion to Add to the Record on Appeal at 9. This bald recital, however, does not forestall our independent inquiry. See *Morgan v. United States*, 298 U.S. 468, 477 (1936).

did occur. The most serious instance is on page 19 of the Report where the technical panel rebuts the Regional Administrator's finding that PSCO had failed to supply enough data on species' thermal tolerances by saying:

"There is little information in the record on the thermal tolerances of marine organisms exposed to the specific temperature fluctuation associated with the Seabrook operation. However, the scientific literature does contain many references to the thermal sensitivity of members of the local biota."

Whether or not these references do exist and whether or not they support the conclusions the panel goes on to draw does not concern us here. What is important is that the record did not support the conclusion until supplemented by the panel.<sup>21</sup> The panel's work found its way directly into the Administrator's decision at page 27 where he discusses the Regional Administrator's concerns about insufficient data but then precipitously concludes, "On the recommendation of the panel, however, I find that . . . local indigenous populations will not be significantly affected." This conclusion depends entirely on what the panel stated about the scientific literature.

Similar, though less egregious, examples occur in the Report at pages 13-14 ("Thus, while it is true that the applicant did not perform exhaustive studies on all [Representative Important Species] it is not true that nothing is known about these species, their biology, distribution or value to the ecosystem."); page 27 ("We concur . . . that there was no evidence on the question of whether there will be any impact on wildlife, such as birds. . . . Since we conclude that holoplankton . . . are not likely to be

<sup>21</sup> We are not persuaded that the panel was referring to some other location in the record, for instance literature cited by a witness. Such a construction of the panel's statement would contradict its plain meaning by indicating that information not in the record might be in the record.

adversely affected, it is unlikely that there would be any conceivable impact at the top of the food chain.); and page 30 ("We agree that only limited data exist on the migratory pathways of fish to and from Hampton Harbor . . . . Nevertheless there have been substantial studies performed on fish migratory behavior; some of these have been done at power plant sites.") These find their way into the Administrator's decision at pages 25-26, 33-34, and 37, respectively.

We do not challenge the reliability of the panel, nor do we question the principle that informed opinion may be able to determine that information the Regional Administrator found lacking was either unavailable or irrelevant.<sup>22</sup> On such issues the Administrator would be free to reverse the Regional Administrator. But the instances pointed to above, with the possible exception of page 27 of the Report, are of a different sort. The panel did not say that the information missing was unavailable or irrelevant; instead they supplied the information. They are free to do that as witnesses, but not as deciders.

The appropriate remedy under these circumstances is to remand the decision to the Administrator because he based his decision on material not part of the record. We are compelled to treat the use of the Report more severely than the use of the PSCO post-hearing submission because no party was given any opportunity to comment on the panel's Report. *See generally Northeast Airlines, Inc. v. Civil Aeronautics Board*, 345 F.2d 484, 486 (1st Cir. 1965). By contrast, all parties were given the opportunity to

<sup>22</sup> The technical panel advanced this proposition in its report at page 1. *See also* the Administrator's decision at page 21. Because the following question goes to whether the decision is supported on the record rather than whether proper procedures were followed, we need not decide whether it is legitimate to examine the record "in the light of an informed scientific judgment" for the purpose of deciding that a danger is too small to require information to find out how large the danger is. *See id.*

comment on PSCO's submission, and these comments were considered equally part of the record by the Administrator. We did hold that it was error to let the submission become part of the record, unless at an adjudicatory hearing. At such a hearing, however, the Administrator would have discretion to refuse cross-examination. 5 U.S.C. § 556(d). *See note 16, supra.* The remand on the point was to let the Administrator decide how he would use his discretion, assuming that all the materials in fact submitted had been in conjunction with an adjudicatory hearing. If the Administrator still would not allow cross-examination, then it would be pointless to require a hearing for the sole purpose of reading written statements into the record.

The Administrator will have the options of trying to reach a new decision not dependent on the panel's supplementation of the record; of holding a hearing at which all parties will have the opportunity to cross-examine the panel members and at which the panel will have an opportunity to amplify its position;<sup>23</sup> or of taking any other action within his power and consistent with this opinion.

#### Conclusion

Because of this resolution, we do not reach the question of whether the Administrator's opinion was supported by substantial evidence. 5 U.S.C. § 706(2)(E). The Administrator must first set the record in order and reach his own conclusions on the state of the record as it will then stand.

#### So ordered.

<sup>23</sup> We are prepared to say, on the basis of the record before us, that if the Administrator does choose to hold a hearing at which the technical panel members are witnesses, cross-examination will be "required for a full and true disclosure of the facts." 5 U.S.C. § 556(d). Consistent with our holding in respect to the PSCO submission, of course, the testimony of the panel members cannot become part of the record except at an adjudicatory hearing.



**UNITED STATES OF AMERICA  
BEFORE THE  
ENVIRONMENTAL PROTECTION AGENCY**

IN THE MATTER OF  
PUBLIC SERVICE COMPANY OF  
NEW HAMPSHIRE, ET AL.

(SEABROOK STATION, UNITS 1 and 2)

National Pollutant Discharge  
Elimination System Permit  
Application No. NH 0020338

Case No. 76-7

**DECISION OF THE ADMINISTRATOR**

This is a decision on appeal from the Initial Decision ("I.D.") of the Regional Administrator ("RA") of Region I of the Environmental Protection Agency ("EPA" or the "Agency") dated November 9, 1976. For the reasons set forth below, the I.D. is reversed.

This matter has received extraordinary attention from the press and the public, because of the public debate concerning whether a nuclear plant should be built at a location such as that chosen by the Public Service Company for the Seabrook Station. I think it is important to emphasize that the Agency has played a very narrow role in the process of governmental approval of this nuclear power plant. The Agency's function in this case is to determine whether the proposed thermal discharge will assure the protection and propagation of a balanced, indigenous population of fish, shellfish and wildlife in and on the receiving waters, and to determine whether the intake structures reflect the best technology available for minimizing adverse environmental

impact. This decision should not be interpreted as representing EPA policy on either nuclear power or the overall environmental desirability of the Seabrook plant.

**I. Background**

*A. Procedural Setting*

On August 1, 1974, Public Service Company of New Hampshire ("PSCo"), on behalf of itself and the owners of a nuclear electric generating station proposed to be constructed in Seabrook, New Hampshire, filed with Region I an application for an NPDES permit pursuant to Section 402 of the Federal Water Pollution Control Act, as amended ("FWPCA"), 33 U.S.C. § 1251 *et seq.* Because the applicable regulations as then proposed (39 F. R. 8294) and later promulgated (40 C.F.R. Part 423) would require no discharge of heat from the main condensers, with certain limited exceptions, PSCo requested the imposition of a less stringent thermal standard pursuant to Section 316(a) of FWPCA. The filing of the application also brought into play the provisions of Section 316(b) of FWPCA, which require that the location, design, construction and capacity of the cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

PSCo also had pending at the time applications for construction permits filed in July, 1973 with the United States Atomic Energy Commission ("AEC"), now the United States Nuclear Regulatory Commission ("NRC"), pursuant to the Atomic Energy Act of 1954, as amended. The NRC exercises responsibilities both under that Act and under the National Environmental Policy Act of 1967 ("NEPA"). Action on PSCo's applications proceeded concurrently before the AEC and EPA. In November, 1974, EPA and the AEC published a proposed Second Memorandum of Under-

standing Regarding Implementation of Certain AEC Responsibilities (39 F.R. 39491, November 7, 1974) ("Proposed Second Memorandum"), which amplified the procedures for coordinating their NEPA and FWPCA responsibilities.

In Paragraph 5 of the Proposed Second Memorandum, EPA agreed to use its best efforts to evaluate impacts on water quality and biota pursuant to Sections 402 and 316 of FWPCA and to complete cooling water intake structure evaluations pursuant to Section 316(b) as far as possible in advance of AEC's issuance of a construction permit. For this purpose EPA undertook to develop regulations establishing a procedure for issuance to the applicant, where appropriate, of "preliminary determinations" specifying the terms and conditions proposed for an NPDES permit pursuant to Sections 316(a) and (b). Paragraph 5 acknowledged that the purpose of the preliminary determinations was to assure, to the extent possible, that considerations regarding impacts on water quality and biota would not result in the need for significant changes in plant design or location subsequent to the completion of AEC's environmental review.

Region I held a public hearing on the application on January 30, 1975 in Seabrook, New Hampshire. Thereafter, no regulations providing for issuance of "preliminary determinations" having been issued by the Agency, on June 24, 1975 Region I issued Determinations concerning Section 316(a) and (b) "procedurally by analogy" to the NPDES and Section 316(a) regulations. These Determinations in effect approved of once-through cooling for Seabrook on certain conditions, but did not specify the location of the intake structure. On October 24, 1975, Region I issued Determinations specifying the location of the intake structure.

The Seacoast Anti-Pollution League and the Audubon Society of New Hampshire (collectively referred to herein as "SAPL") filed requests for adjudicatory hearings with respect to both Determinations as provided in 40 C.F.R. § 125.36. The requests were granted by the RA. Thereafter PSCo and the Attorney-General of New Hampshire ("NHAG") requested admission as parties. The hearings were consolidated and held between March 23 and April 2, 1976. The record was certified by the Administrative Law Judge to the RA on May 21, 1976, in accordance with 40 C.F.R. § 125.36(1)(i). On November 9, 1976 the RA issued the I.D., in which he revoked the Determinations. PSCo then filed a Petition for Review with the Administrator. On December 7, 1976 the Administrator granted PSCo's appeal on two issues: the impact of the thermal discharge and the intake design and location. The Administrator stated that PSCo's arguments as to burden of proof were to be presented in the context of these issues.

Briefs were filed on January 6, 1977 by PSCo and by *amici curiae* Appalachian Power Company, *et al.* (the "Utilities"). Briefs were filed on February 7, 1977 by the EPA, SAPL, and NHAG and by the following *amici curiae*: the National Wildlife Federation, the New Hampshire Wildlife Federation and the Natural Resources Council of Maine (collectively referred to herein as "NWF"); the Natural Resources Defense Council and the Conservation Law Foundation of New England (collectively referred to herein as "NRDC"); and Meldrim Thomson, Jr., Governor of the State of New Hampshire. In addition, on February 7, 1977 the Utilities moved to file a reply brief, and on February 22, 1977 PSCo moved to file a reply brief. These motions were opposed by SAPL and are discussed below.

Section 125.36(n)(12) of the regulations provides that the Administrator shall decide the matters under review on



the basis of the record presented and any other consideration he deems relevant. Because of the complexities of this case I convened a panel of technical and scientific experts to assist in my review of the record. I have considered the advice of these experts in coming to my decision set forth herein. I also requested and received from PSCo a document mentioned in their brief and not included in the record, entitled "Assessment of Thermal Plume Mortality Attributable to Seabrook Station Cooling Water Discharge Off Hampton Beach, New Hampshire." In addition, as mentioned below, on March 23, 1977 I issued a Request for Information with respect to certain aspects of backflushing, and I have considered all information received in response to that request.

#### B. *Factual Setting*

The proposed nuclear electric generating facility, Seabrook Station, will consist of two units, one estimated to begin operation in 1981 and the other in 1983. It will be located in Seabrook, New Hampshire near the Hampton Harbor estuary, about two miles inland from Hampton and Seabrook Beaches (which are on the Gulf of Maine portion of the Atlantic Ocean). As part of the process of generating electricity at the plant, steam which has passed through the turbines must be condensed. Condensing the steam requires the removal of heat and the rejection of this heat to the environment by some type of cooling system. The quantity of heat which must be rejected each hour is  $16 \times 10^9$  BTU, which is the amount of heat that would be obtained from 113,465 gallons of No. 2 fuel oil.

The Seabrook Station condenser cooling water system is called a "once-through" system because there is neither recirculation of cooling water nor any supplementary cooling device, such as a cooling tower or pond. Cold water from

the ocean will be drawn into a tunnel through a three-structure intake, at the rate of 824,000 gallons per minute (gpm). The water will flow to the plant, where it will remove heat by conduction through the condenser tubes. At full power, the temperature of this condenser cooling water will increase by approximately 39° F. (The difference between the temperature of the water as it is drawn into the intake and the temperature of the water after it has been heated by passing through the condenser tubes is referred to as the delta-T.) The water will then flow back through another tunnel to a submerged multi-port diffuser where it will be discharged into the ocean. The quantity of heated water discharged will average 1,187,000,000 (approximately 1.2 billion) gallons per day.

The Seabrook Station would have the highest delta-T of any steam electric generating station now operating in the United States; several stations have higher volume. PSCo states in its Brief (at p. 6) that:

This high delta T was deliberately chosen in consultation with the marine biologists advising PSCo in order to minimize the volume of water which must be utilized for cooling purposes. This choice was made on the theory that inasmuch as the long travel times and substantial pressure changes necessitated by the use of open ocean, as opposed to estuarine, cooling water coupled with the normal mechanical and chemical effects of any condenser would result in significant (if not total) mortality to entrained organisms, the way to minimize entrainment mortality was to minimize the volume of water utilized. Since the amount of heat to be removed is dictated by the laws of thermodynamics, the only way to reduce the volume of water needed to perform the removal task is to increase the amount of heat removed per unit of water volume, i.e., increase the delta T. Thus, while Seabrook Station will have a delta T that is unusually high, it will take in one-half the water a system having a 20 delta T would, putting at risk one-half the number of entrained organisms.

Seabrook Station would have cooling water intake structures within the meaning of Section 316(b) of FWPCA. The intake will consist of three structures, each of which is connected to the intake tunnel by a 9-foot diameter riser shaft. Each structure will be circular, with the lower lip being a minimum of 7 feet off the bottom; the top of the structure will be a velocity cap 7 feet above the lower lip; both the lower lip and the velocity cap will have a diameter of 30 feet 6 inches. The three structures will be located 110' apart in a straight line running southeast to northwest. Each structure will take in ocean water at approximately 600 cubic feet per second (cfs), or a total of 1800 cfs, with an entrance velocity of approximately 1 foot per second (fps).

PSCo originally proposed that the intake location should be approximately 3,000 feet east of Hampton Beach in water about 38 feet deep, mean sea level ("MSL"), with the intake openings being approximately 24 feet through 31 feet below the surface, MSL. (This location is herein referred to as the "near site"). In the October 24 Determinations, the Regional Administrator required that the ports be located approximately 4,000 feet northwest of the near site in water approximately 41 feet through 48 feet below the surface, MSL. (This location is herein referred to as the "far site".)

The diffuser through which the cooling water will be discharged will consist of twenty-two nozzles spaced in pairs along a 1000-foot line oriented generally northwest to southeast. The discharge nozzle closest to the shore will be about 5,400 feet east of Hampton Harbor Inlet. The discharge nozzles will be approximately 45 feet below the water surface and seven feet above the ocean floor. The design discharge velocity is 15 fps in a generally eastward direction and oriented at various angles (either 20° or 25°, depending on the nozzle) above the horizontal.

Another aspect of the condenser cooling system of relevance is the so-called "backflushing" operation to clean the intake tunnel. This consists of reversing the flow of the system once or twice a month so that water is drawn in through the diffuser and is discharged through the intake structures. After flow is reversed, the discharge water is brought to a temperature of 120°F by recirculation through the condenser and held at that temperature, through the entire length of what is normally the intake tunnel, for a minimum of two hours. This procedure is intended to control biofouling in the intake tunnel by killing any organisms which may have settled and grown in the tunnel.

## II. Preliminary Matters

### A. *The Appalachian Power Case*

The Agency's effluent limitation guidelines and standards for the Steam Electric Power Generating Point Source Category, 40 CFR Part 423, issued pursuant to Sections 301, 304, 306 and 316(a) of FWPCA on October 8, 1974, were challenged by publicly and privately owned electric generating companies in *Appalachian Power Co. v. Train*, Civ. Nos. 74-2096 *et al.*, 9 E.R.C. 1033 (4th Cir. 1976). It was these regulations that established closed-cycle cooling as "best available technology economically achievable" ("BATEA") under Section 301(b)(2)(A) of FWPCA for plants such as Seabrook.

The plaintiffs argued that the Agency's regulations were invalid because the Agency failed to balance the overall social benefits to be derived from its regulations against their social costs. While rejecting the contention that benefits derived from a particular level of effluent reduction must be quantified in monetary terms, the court held that the Agency must consider the benefits derived from the application of its effluent reduction requirements in relation to



the associated costs of alternative levels of heat reduction in order to determine whether the resulting progress is "economically achievable" and whether the reduction in heat discharged represents "reasonable further progress toward the elimination of pollutants." The court also directed that EPA reevaluate its requirements for closed-cycle cooling at generating units located along the coastline.

The effect of the remand of the steam electric generating guidelines was, as urged by the Utilities, to require the Agency to determine what is BATEA for existing sources on a case-by-case basis under Section 402(a)(1). Since the *Appalachian Power* opinion was handed down on July 16, 1976, after the issuance of the Determinations and the adjudicatory hearing, the RA was faced with the dilemma of how to treat the decision in the pending 316(a) request for the Seabrook Station. The RA seemingly had two choices: he could start from scratch to determine what is BATEA for the Seabrook Station, and then go to the 316(a) determination if the BATEA requirements were more stringent than the applicant's requested 316(a) effluent limitations, or he could simply assume that the reconsidered BATEA standards would be more stringent and that PSCo's 316(a) request would represent a relaxation from that requirement. The RA chose the latter course.

PSCo urges that this is arbitrary, capricious and contrary to law; it does not, however, suggest what position the RA should have adopted instead. PSCo never requested the RA to make a determination of BATEA under Section 402(a). I find that the RA's assumption was an expeditious and reasonable way of ruling on PSCo's pending application without further delay under the unique circumstances of this case.

<sup>1</sup> It was determined by the RA that Seabrook Station is not a new source and this determination was not appealed.

## B. Nature of Section 316(a) and (b)

The RA discussed the nature of 316(a) and (b) and came to some conclusions which are of interest beyond the circumstances of this case. Because this is the first ruling I have made with respect to Section 316, discussion of these aspects of the RA's decision is merited to provide further guidance to all interested persons as to Agency's interpretation of Section 316.

(1) *Consideration of Costs under Section 316(b)*. The RA followed the Agency policy set out in the preamble to the 316(b) regulations (41 F.R. 1738 *et seq.*), which provides that the Agency must identify or predict adverse environmental effects and then select the most effective means of "minimizing" (defined in the preamble as "reducing to the smallest possible degree") the adverse effects. The preamble interprets "best technology available" to mean "best technology commercially available at an economically practicable cost", based on legislative history, and states that Section 316(b) does not require a formal cost/benefit analysis. However, the RA stated that:

Determining the degree of minimization required calls for a balancing of costs with the magnitude of the environmental impact to be avoided to achieve a reasonable relationship between the costs of the technology and the magnitude of adverse environmental harm avoided.

The RA and the Agency both take the position that, since the regulations require a case-by-case determination of best available technology, consideration of the economic practicability must also be conducted on a case-by-case basis.

The Utilities argue that cost/benefit balancing is required under Section 316(b) and urge affirmance of the RA's decision insofar as it appears to agree with this position. The Utilities cite *DuPont v. Train*, 541 F. 2d 1018,

8 ERC 1718 (4th Cir. 1976) and *Appalachian Power, supra*. In *Dupont*, the Fourth Circuit held that a cost/benefit analysis was required under Section 304(b)(1)(B) with respect to the determination of what is "best practicable control technology currently available" under Section 301(b)(1)(A); Section 304(b)(1)(B) expressly required the Agency to take into account "the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application." In *Appalachian Power*, as discussed above, the Fourth Circuit held that in determining whether its regulations specified "best available technology economically achievable . . . which will result in reasonable further progress towards the national goal of eliminating the discharge of all pollutants" under Section 301(b)(2)(A), the Agency must consider the benefits derived from the application of its effluent reduction requirements in relation to the associated costs to determine whether in fact the resulting progress is "economically achievable" and whether the progress is "reasonable." The Utilities argue that since "best available technology economically achievable" is equivalent to the term "best technology commercially available at an economically practicable cost," *Appalachian Power* dictates a cost/benefit balancing under Section 316(b).

I believe that neither *DuPont* nor *Appalachian Power* is dispositive of the issue and that the Agency's position, that cost/benefit analysis is not required under Section 316(b), is correct. Section 316(b) provides flatly that cooling water intakes shall "reflect the best technology available for minimizing adverse environmental impact." Unlike Sections 301 and 304, Section 316(b) determines what the benefits to be achieved are and directs the Agency to require use of "best technology available" to achieve them. There is nothing in Section 316(b) indicating that a cost/

benefit analysis should be done, whereas with regard to "best practicable control technology currently available" and "best available technology economically achievable" Congress added express qualifiers to the law indicating a requirement for cost/benefit analysis. Indeed, but for one bit of legislative history,<sup>2</sup> there would be no indication that Congress intended costs to be considered under Section 316(b) at all. I find, therefore, that insofar as the RA's decision may have implied the requirement of a cost/benefit analysis under Section 316(b), it was incorrect.

However, the RA may have meant only that some consideration ought to be given to costs in determining the degree of minimization to be required. I agree that this is so — otherwise the effect would be to require cooling towers at every plant that could afford to install them, regardless of whether or not any significant degree of entrainment or entrapment was anticipated. I do not believe that it is reasonable to interpret Section 316(b) as requiring use of technology whose cost is wholly disproportionate to the environmental benefit to be gained.

(2) *Interdependence of Section 316(a) and (b)*. The RA ruled that a determination of the effect of the thermal discharge cannot be made without considering all other effects on the environment, including the effects of the intake (i.e., entrainment and entrapment); the applicant must persuade the RA that the incremental effects of the thermal discharge will not cause the aggregate of all relevant stresses (including entrainment and entrapment by the intake structure) to exceed the 316(a) threshold. I believe this is the correct interpretation of Section 316(a).

<sup>2</sup> A Legislative History of the Water Pollution Control Act Amendments of 1972, ("Legis. Hist.") 93rd Cong., 1st Session, p. 264.



The effect of the discharge must be determined not by considering its impact on some hypothetical unstressed environment, but by considering its impact on the environment into which the discharge will be made; this environment will necessarily be impacted by the intake. When Congress has so clearly set the requirement that the discharge not interfere with a balanced indigenous population, it would be wrong for the Agency to put blinders on and ignore the effect of the intake in determining whether the discharge would comply with that requirement.

The Utilities argue that the Agency has recognized the independence of 316(a) and (b) in the preamble to the regulations, which states that the "concerns of the two sections are different and the legal standards by which compliance with their requirements is to be judged are similarly distinct" (41 F.R. 17389). As SAPL points out, the fact that the legal standards of the two sections are different does not mean that factual aspects of the intake may not be considered in making a legal conclusion about the discharge.

The RA also ruled that, as a matter of sound statutory interpretation and good policy, an intake structure would not (as a threshold matter) be "minimizing" adverse environmental impacts if, for example, its entrainment and entrainment effects (examined in the context of all projected stresses on the environment) would interfere adversely with "the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife." I find it unnecessary to rule whether this interpretation is correct because I have determined that the intake structures (examined in the context of all projected stresses on the environment) will not interfere with "the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife."

Finally, the RA ruled that even if entrainment and entrapment effects would not cause an "imbalance" they must be "minimized." This is in accord with Agency policy that "the conclusion in a 316(a) hearing should not necessarily govern the outcome of 316(b)" (41 F.R. at 17389). Thus, the RA concluded, even if the 316(a) burden were met, an applicant could face restrictions on intake capacity which could only be met by use of closed-cycle cooling. I believe this conclusion is also correct. As mentioned above, some consideration of cost relative to the environmental benefits to be obtained through further minimization would be appropriate.

PSCo argues that the interdependent interpretation of 316(a) and (b) is wrong because it makes it impossible for any applicant to obtain a 316(a) ruling; they point out that the RA ruled the 316(a) showing failed because of the potential effects of the intake structures and at the same time said it was premature to set 316(b) conditions because no 316(a) standard had been established. I do not foresee any difficulty in this regard. The 316(a) and (b) decisions can be made concurrently. Indeed, in cases such as this one, the 316(a) and (b) determinations must necessarily be considered together because the discharge functions as an intake during backflushing and vice versa.

(3) *Meaning of Term "Capacity" in Section 316(b)*. The RA stated that under Section 316(b) restrictions could be imposed on intake capacity which could only be met by application of closed-cycle technology. It is important to note in this connection that the 316(b) regulations define "capacity" as "the maximum withdrawal rate of water through the cooling intake structure" (40 CFR § 122.11(e)). The Utilities state that the RA "assumed he could impose closed-cycle cooling under §316(b);" they then argue that 316(b) regulates only the intake structures appurtenant to

whatever discharge control technology is independently chosen under other sections. They also argue that "capacity" properly refers to the size of the intake structure, not volume of flow or rate of flow.

It is Agency policy that the Agency may not require use of cooling towers under 316(b); however, it may restrict the capacity of the intake structures and thus indirectly necessitate a closed-cycle system.<sup>3</sup> The RA clearly said no more than this.

The Utilities' explanation for the restrictive reading of the term "capacity" is that the size of a structure, in conjunction with the quantity of water needed per unit time by a given cooling system, determines intake velocity. Although intake velocity is one factor affecting entrainment, it is the volume of water withdrawn that principally determines entrainment. There is no justification for giving "capacity" the restrictive meaning ascribed to it by the Utilities, especially since Congress was aware of and concerned about the entrainment effects of intakes (Legis. Hist. at 196-7). The Agency's definition is supported by the literal definition of "capacity" and by the intent of Congress to minimize adverse environmental effects caused by intake structures.

### C. Burden of Proof — 316(a)

The burden of proof rules in the Agency's NPDES regulations (40 CFR §125.36(i)(1)), which the RA applied "procedurally by analogy" in this case, provide that the burden of going forward and the burden of proof are on the party raising the issue at the hearing. The RA held that these rules were only for purposes of the hearing and that the

<sup>3</sup> Decision of the General Counsel on Matters of Law No. 41, Issue No. III, June 1, 1976.

burden of proof in 316(a) cases rests on the applicant throughout the entire permit proceeding.

PSCo argues that an agency is bound by its own rules and that the RA misinterpreted the burden of proof rules. Based on its burden of proof argument, PSCo complains throughout its brief that the RA "interposed issues not raised by the parties." It also complains, when the RA "finds" that there is inadequate evidence on various points, that these "findings" are not "supported by the record." The Agency argues that "burden of proof" can mean either burden of persuasion or burden of producing evidence; the burden of persuasion remains always with the same party but the burden of producing evidence can shift between the parties. The Agency argues that SAPL had a burden of showing that PSCo's proposed limitations might not assure protection of the marine ecosystem, and that PSCo had the burden of persuading the RA that a "no discharge of heat" limitation was more stringent than necessary.

I find the RA's and the Agency's interpretation of these regulations to be without merit. Clearly the "burden of persuasion" and the "burden of producing evidence" are the same as the "burden of proof" and the "burden of going forward," both of which the NPDES rules place on the person raising the issue.

However, I do agree with SAPL and NRDC that the burden of proof rules in the NPDES regulations are inconsistent with the requirement of Section 316(a) that the applicant must "demonstrate" his entitlement to a 316(a) waiver. Until the Agency has had an opportunity to listen to all points of view its Determinations should not be final and, until they are final, the applicant, under Section 316(a), has the burden of proof. Accordingly, the regulations at 40 CFR § 125.36 were inappropriate for 316(a) hearings in



this regard, and I am directing the Office of General Counsel to consider the need for issuance of regulations designed especially for 316(a) hearings.

Though I disagree with the RA's decision regarding the adequacy of the evidence in this case and find that PSCo has in fact carried its burden of proof, I agree with the principle that an RA has the power and the obligation to reverse his Determinations, regardless of the burden of proof rules, when he concludes that his Determinations were incorrect. This would especially be so where he determines that data adequate to support his Determinations are lacking in the record. The Agency is the representative of the public interest and is not "an umpire blandly calling balls and strikes for adversaries appearing before it; the right of the public must receive active and affirmative protection"<sup>4</sup> at the hands of the Agency. The courts have made clear that the Agency must take affirmative steps to obtain the information necessary to sound decisions under the statutes it administers, even at the cost of delay; if there is insufficient evidence in the record to sustain the Determinations, there is no choice but to reverse the Determinations until adequate data are adduced. Therefore I commend the RA for the courage and responsibility shown by him in his I.D.

I wish to emphasize that this case points out the importance of close scrutiny by the Regions of an applicant's plans for a 316(a) demonstration and its implementation of those plans; it also highlights the need for a thorough analysis of the applicant's submission before issuance of Determinations. I note in this regard that PSCo's demonstration appears to consist of a series of reports and affi-

<sup>4</sup> *Scenic Hudson Preservation Conference v. FPC*, 354 F.2d 608, 620 (2d Cir. 1965), cert. denied, 384 U.S. 941 (1966) (*Scenic Hudson I*).

davits without the "interpretive, comprehensive *narrative summary* of the demonstration . . . [including] a clear discussion stating why the applicant's demonstration is sufficient to assure that the proposed discharge will assure the protection and propagation of a balanced, indigenous community"<sup>5</sup> suggested by the Draft 316(a) Manual. Review both at the Regional level and on appeal would be assisted by such a document. Without passing on the merits of that case, I note that the RA's Determination of March 4, 1977 regarding a proposed unit at the Pilgrim Power Plant appears to provide the type of discussion I have in mind.

#### D. *Burden of Proof — 316(b)*

The Utilities argue that the Agency has a duty to implement Section 316(b) and that the RA's decision improperly shifted the burden of proof to the applicant by adopting rules of thumb. For instance, the RA said that an intake structure should be located in waters which are the least productive biologically and should avoid areas such as spawning areas, nursery areas, etc. The Utilities argue that this, coupled with the RA's unduly stringent standard of proof (discussed below), amounts to a *per se* rule requiring closed-cycle cooling at all estuarine plant locations. They point out that the Agency expressly declined to adopt such a *per se* rule in the preamble to the 316(b) regulations (41 F.R. 17388).

The RA essentially did no more than repeat the language of the Development Document accompanying the 316(b) regulations, which concluded with respect to consideration of location in 316(b) cases that:

Plant siting and the location of the intake structure with respect to the environment can be the most important

<sup>5</sup> Draft 316(a) Technical Guidance — Thermal Discharges, September 30, 1974, p. 7.

consideration relevant to applying the best technology available for cooling water intake structures. Care in the location of the intake can significantly minimize adverse environmental impacts . . . [A]mong the many factors that can be considered in locating the intake structure to minimize adverse environmental impacts [are] . . .

— Avoidance of important spawning areas, fish migration paths, shellfish beds or any location where field investigations have revealed a particular concentration of aquatic life.

It will be difficult [sic] and perhaps impossible in certain cases to offset the adverse environmental impact of improper intake location by subsequent changes in either design or operation of the intake structure short of significantly reducing the intake volume and/or the development of an effective fish recovery or diversion system. (at 178)

Substantially similar language was contained in the predecessor Development Document dated December 1973, at 144-5. It is clear that the RA did not establish a *per se* locational rule, but merely considered the intake in the light of the factors described above.

#### E. *Standard of Proof*

The RA said the applicant must provide the RA with "the evidentiary showing needed to make a reasoned decision" as to whether the 316(a) test was met and that "adequate information" must be furnished as to the projected stresses on the aquatic environment from all sources. This is clearly correct. However, in the I.D. the RA occasionally used some phrases which implied a much higher standard of proof. For instance, he said that information on the "the whole marine ecosystem" may be necessary.

PSCo argues that the RA imposes an impossible standard of proof under 316 because he demands a showing with respect to the "whole marine ecosystem" and he seeks abso-

lute assurance and scientific certainty in an area which is complex and uncertain. PSCo argues that the proper rule is "preponderance of the evidence". The Utilities join in this argument. Also, they argue, the RA refused to make an intelligent choice on the basis of reasonably available evidence; the effect is to require cooling towers in every case because the RA is requiring evidence to a degree of precision which is in fact unattainable.

As the Agency points out, the burden of proof in a 316(a) case is a stringent one. The "preponderance of the evidence" rule would be inappropriate if the evidence being weighed were inadequate. The RA may not speculate as to matters for which evidence is lacking. On the other hand a biologist experienced with thermal discharges, who reviews evidence as to certain species, can often conclude with assurance (based upon his knowledge and experience) that adverse effects will not be suffered by other species or life stages not mentioned.

The question is, at what point is the evidence adequate for a 316(a) determination? No hard and fast rule can be made as to the amount of data that must be furnished. Much depends on the circumstances of the particular discharge and receiving waters. It would be an unusual case where data would be required as to the effects on the "whole ecosystem".\* Effects on one group of organisms can generally be inferred from the effects on another group of organisms. This is the theory behind the representative

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\* The difficulty of precisely modeling the "whole ecosystem" increases exponentially with the number of species in the system. Thus, while it is possible to model a system of, say, five species which interact with each other, this task becomes extremely difficult with most natural systems. The reason is that most systems are comprised of hundreds or thousands of species; the possible interactions are astronomical.



important species ("RIS") approach to 316(a) demonstrations (40 CFR § 122.9(b)(2)). Data should not be required to be furnished simply because they are collectible, if the data would not aid in the determination to be made. For instance, in this case the RA found that data as to the thermal tolerances of certain life stages of RIS were missing. Though this is true, I find that, examining the data in the record in the light of an informed scientific judgment, it is not necessary for PSCo to furnish further data; the available data are sufficient for me to conclude that there will not be an imbalancing of indigenous populations. However, in another case, the applicant might have to furnish not only complete data as to the RIS, but possibly additional data.<sup>7</sup> The greater the risk, the greater the degree of certainty that should be required. The rule is stated reasonably well in the Draft 316(a) Manual:

Mathematical certainty regarding a dynamic biological situation is impossible to achieve, particularly where desirable information is not obtainable. Accordingly, the Regional Administrator (or Director) must make decisions on the basis of the best information reasonably attainable. At the same time, if he finds that the deficiencies in information are so critical as to preclude reasonable assurance, then alternative effluent limitations should be denied. (p. 8)

In this connection I note that the RA apparently felt constrained to avoid discussion of the merits of the case with

<sup>7</sup> The regulations make it clear that the granting of a 316(a) request after a RIS demonstration is permissive and not mandatory (40 CFR § 122.9(a)(2) and (b)(i)). Moreover, 40 CFR § 122.9(b)(2)(iii)(A) provides that "in determining whether or not the protection and propagation of the representative, important species will be assured the Regional Administrator may consider . . . any additional information submitted by the owner or operator or required by the Regional Administrator." (Emphasis added.) Thus, in appropriate cases the Regional Administrator may request information beyond that furnished in the normal RIS demonstration.

his technical staff after the hearing because they were "parties" to the case and could not be consulted in the absence of the other parties. Consequently the RA was deprived of the opportunity to consult with experts experienced in the matter of thermal discharges, and reviewed the record with only the assistance of his legal staff and a biologist hired for the purpose. This unfortunate result appears to have occurred partly because the Agency took a position in favor of its Determinations (i.e., in support of PSCo) at the hearings, thus becoming "party" as well as judge. This seems to me to have been unnecessary and of dubious propriety.

I am requesting my staff to review this aspect of the case with a view toward assuring that in future 316 cases RAs will have available to them adequate Agency resources to assist in the review of the record. In connection with the review of the regulations mentioned above, I am asking the Office of General Counsel to review the question of whether the Agency should act as a "party" in 316(a) proceedings.

#### F. *Receiving Waters*

One of the underlying questions to be considered in making the decision in this case was what should be considered as the receiving waters. The Hampton-Seabrook area is part of the Gulf of Maine, a much larger body of water, which in turn is part of the Atlantic Ocean. Obviously an impact which created an imbalance in the local indigenous populations might not be felt in the Gulf of Maine or the Atlantic Ocean. Put another way, if the Atlantic Ocean (or a portion of it as large as the Gulf of Maine) is to be considered as the receiving water, then Section 316 might be a dead letter as to coastal power plants because plants of a size likely to be built probably would not have an effect on such an enormous body of water. Therefore I think that in

order to give effect to Section 316 it is necessary to look at a smaller portion of the coastal waters where human use or enjoyment of the marine resource may be affected. The portion chosen is necessarily arbitrary to some extent where, as in this case, there are no obvious physical boundaries.

For this case I have determined that the appropriate area to look at in considering the effects of Seabrook's discharge is the localized area within and proximal to Hampton Harbor, which includes the estuary area with its biologically rich fauna. However, while doing this I have taken into account the fact that this localized area is part of, and is fed by, the larger area of the Gulf of Maine and the Atlantic Ocean. For instance, local populations of certain species of fish are supplemented by recruitment from the Gulf of Maine. Thus the impact of the Seabrook discharge on this localized area is less than it would be if the localized area were a closed body of water of the same size.

### III. The Thermal Discharge (316(a))

#### A. *Effect under Normal Conditions*

The RA found, on his review of the record, that there was inadequate evidence as to the direct and indirect effects of the thermal discharge on indigenous populations, in various particulars.

In reviewing the adequacy of the record I have utilized the expert judgment of the technical and scientific panel mentioned above. The biological experts on the panel reviewed the record with the benefit of their general knowledge and judgment. The technical and scientific panel also have experience with thermal discharges and were able to bring their experience to bear in determining the probable effect of the Seabrook operation on RIS and indigenous populations.

Unlike many other plants, Seabrook will use a multiport, high-velocity diffuser which is designed to minimize the exposure of marine organisms to high temperature regions. This design means that there will be only a small area or volume of water in which significant lethal or sublethal effects would be expected on any organisms. (This is quantified in PSCo's brief, which states that under full load conditions, the 10°F isotherm will encompass a maximum volume of 0.33 acre/feet and the 5°F isotherm will encompass a maximum volume of 3.03 acre/feet).<sup>8</sup> Thus the Seabrook discharge will affect only a small portion of the Gulf of Maine within or proximal to Hampton Harbor.

Moreover, I believe, on the recommendation of the panel, that the intake should be located at the far site, which will further minimize any potential environmental effects. The data are inadequate for a 316(a) demonstration at the near site because worst case conditions were not assumed in modeling the thermal impact of backflushing from the near site on the Sunk Rocks. In any event, the far site is much preferable to the near site because: 1) there will be less likelihood of thermal impact on the Sunk Rocks resulting from backflushing at the far site; 2) the near site is located close to the presumed migratory pathways in and out of the estuary; 3) entrainment of meroplankton of coastal species will be less at the far site (this is expected to compensate for the possibility of an increased entrainment of pelagic plankton); and 4) the outcroppings at the Sunk Rocks area will attract fish to this site and will increase entrapment there.

The panel concluded that the net effect is that significant environmental impacts cannot be anticipated in the area

<sup>8</sup> The legislative history indicates that mixing zones are to be considered under 316(a). Legis. Hist. at 264, 167.



affected by the discharge, and that the data available in the record indicate that the "balanced indigenous population" of shellfish, fish and wildlife in the Gulf of Maine within or proximal to Hampton Harbor will not be significantly affected. They therefore concluded that it was not necessary to have thermal effects data on *all* life stages of *all* RIS, as the RA had required.<sup>9</sup> I agree with these conclusions.

Regarding data as to the size and stability of populations, the panel concluded that determinations of the species distribution, abundance and relationships among components of the ecosystem might exceed the state-of-the-art, especially for certain types of organisms. The relationships between and among the species comprising a given assemblage (i.e., "population" as used in Section 316(a)), such as the benthic community or the phytoplankton community, are extremely difficult to define and elaborate. This difficulty increases as a function of the number of components to be considered. As mentioned before, it is much easier to understand or model a community of five species which may interact with each other than one of 20 species. The potential for interaction increases as a factorial of the number of species. Also, generally the species for which studies are available are those of economic or ecological importance, either because of numerical dominance or wide distribution. Consequently, many species have not been studied to a level

<sup>9</sup> I wish to make clear that the amount of data sufficient for 316(a) demonstration in one case may not be sufficient in another case. The degree to which data are required on all life stages of RIS depends to some degree on the situation being examined. The less the magnitude of the risk, the less certain the evidence should have to be in order to allow the risk and vice versa. For example, if either the proposed discharge or intake sites were within an enclosed area (such as Hampton Harbor), comprehensive and complete thermal effects data on appropriate RIS would be necessary.

that permits defining their role in the ecosystem. Accordingly I do not find it necessary to have the degree of information as to size and stability required by the RA in order to make a judgment as to the impact of Seabrook.

The RA also found that there was no useful information in the record concerning the volume of water which would be entrained in the thermal plume and thus no way of estimating the numbers of planktonic organisms, for example, that would be exposed to the heated water. Actually, using data in the record, the numbers of plankton entrained can be approximated. However, even without estimates of numbers of plankton entrained it can be concluded that the overall impact of such entrainment on the population of all plankton in the Gulf of Maine within and proximal to Hampton Harbor will not be significant. This is because the portion of the plume which contains water of sufficient temperature to shock or kill plankton is small relative to the available water mass; many plankton will be quickly replaced because of their rapid regeneration times; and recruitment from other areas will replenish stocks.

The RA was concerned that much of the data on thermal tolerances in the record was based on studies in which organisms had been acclimated to temperatures other than those that will occur at Seabrook and that they were of questionable relevance to an effort to estimate the impact of exposure to a quick temperature increase such as will be experienced by organisms entering the Seabrook discharge. He was also concerned that some studies noted lethal temperature limits below those of the Seabrook discharge even though these studies generally involved gradual temperature increases. The RA felt that, together, the lack of thermal data and the lack of information about numbers of organisms exposed made it impossible to determine the

overall direct impact of the plant. On the recommendation of the panel, however, I find that, given the small area to be impacted with a delta-T greater than 5°F, it is reasonable to conclude that local indigenous populations will not be significantly affected.

#### B. *Effect Under Backflushing Conditions*

The RA found that the record did not contain an adequate discussion of the thermal effects of the intake operating as a discharge during backflushing or of the entrapment potential of the diffuser acting as an intake. Upon review of the record I found it inadequate as to the effect of backflushing. Specifically, I found that there was no information in the record on the vertical structure of the backflushing plume, and therefore the three-dimensional plume structure could not be developed from the information in the record. Hence, estimates of exposures of plankton and other organisms to the various temperature regions of the backflushing plume could not be established. I therefore issued a Request for Information, requesting PSCo to supplement the record with respect to these matters and offering the parties an opportunity to submit comments and requests for a hearing. Affidavits were submitted by PSCo, NHAG, EPA and SAPL. SAPL submitted a request for a hearing, which is dealt with below.

During backflushing, heated effluent discharged from the intake at the far site could, under occasional meteorological and hydrological conditions, cause a 3°-4°F rise for about 3-6 hours twice a month around the Outer Sunk Rocks (less often during the winter). Such a small increase for such short time periods should result in no biologically significant lethal or sublethal effects on the communities in the area of the Sunk Rocks. The discharge will not affect benthos in the vicinity of the backflush because of the buoy-

ant nature of the plume. Nekton should for the most part be able to avoid lethal temperature elevations in the discharge plume, though some fish may be killed upon start-up of the backflushing operations. There is no reason to believe, however, that such fish kills, if they occur, will be in numbers sufficiently large to cause an imbalance in the indigenous population, even taking into account the other stresses upon the affected species.

Plankton could suffer lethal or sublethal effects as a result of entrainment in the higher temperature regions of the backflushing plume. However, the volumes of water which will be heated sufficiently to cause these effects are small. Moreover, the number of plankton killed by passage through the plant will be considerably lower during backflushing than during normal operations, due to the decreased flow. A review of the record convinces me that the impact of backflushing on plankton will be insignificant.

Regarding *Mya* larvae, in response to the Request for Information, PSCo submitted a calculation indicating that 70 bushels of *Mya* would be destroyed indirectly due to the effects of entrainment of larvae in the backflushing plume during the month of maximum impact. PSCo made the assumption that this loss would be distributed evenly over the 2500 acres of clam flats between southern Maine and northern Massachusetts and calculated that only 0.12% of the *Mya* harvest in the Hampton-Seabrook area during 1975-6 would be destroyed. Also, in Draft Technical Report VII-3, PSCo's consultant made similar calculations with respect to normal operations and concluded that normal operations would result in destruction of only 0.4% of the Hampton-Seabrook 1975-6 harvest. These calculations are open to doubt because the survival ratios used would not allow the maintenance of a *Mya* population at equilibrium in the Hampton-Seabrook estuary.



Destruction of *Mya* larvae could result from entrainment through the plant during normal and backflushing operations and entrainment in the thermal plume during normal and backflushing operations. Draft Technical Report VII-3 made a reasonable estimate of *Mya* mortality due to through-plant entrainment as  $83 \times 10^9$  larvae. As indicated above, larval mortality due to plume entrainment during normal operations would be insignificant. It is reasonable to assume that backflushing will occur three times each summer when there are larval *Mya* densities of any significance, and that larval *Mya* densities at those times will be  $2500/m^3$ . Assuming that the average backflushing flow is one-half that of the normal flow rate, it can be calculated that about  $5 \times 10^9$  *Mya* larvae would suffer mortality due to through-plant entrainment during the three backflushing operations.

Regarding entrainment in the backflush plume, in the absence of experimental data to the contrary it is reasonable and probably conservative to assume, as Bosworth did in his supplemental Affidavit, that *Mya* larvae entrained in the backflush plume will be killed if subjected to a temperature greater than  $79^\circ F$ . From the equations provided in the supplemental Affidavit of MacPherson it can be calculated that at a delta-T of  $56^\circ F$  approximately  $12 \times 10^9$  *Mya* larvae will be killed by entrainment in the backflush plume during the three backflushing operations.

Thus the mortality of *Mya* larvae from all sources related to the Seabrook operations would be approximately  $1 \times 10^{11}$ . The total seasonal production of *Mya* larvae in the neritic band in the vicinity of the Seabrook cooling system is reasonably estimated in Draft Technical Report VII-3 as  $2 \times 10^{12}$  larvae. Thus the larvae killed would be about 5% of the larvae in the neritic band in the vicinity

of Seabrook. If it is assumed that destruction of *Mya* larvae would result in destruction of the same proportion of adult clams, the Seabrook operations would be expected to destroy approximately 5% of the standing crop of *Mya* in the Hampton-Seabrook area. (This figure is of the order of magnitude of the figure arrived at by use of an entrainment model discussed elsewhere in this decision.) This 5% figure represents a considerable over-estimate because larvae settle in densities much greater than the final density of adult populations. Considering that a single adult clam, which may have a life span of 3-4 years, releases several million eggs per spawning and may spawn several times each year, a loss of this order is not expected to have a significant impact on local populations.

I note that there appears to be serious over-cropping of *Mya* larvae in the Hampton-Seabrook area, which could doubtless be controlled through appropriate licensing laws. The effects of the Seabrook plant will not have any significant impact on the number of clams recruited to the Hampton-Seabrook flats or other estuaries. The over-cropping of clams in Hampton-Seabrook could have an effect on recruitment of clams to other areas, but probably does not have much impact on recruitment to Hampton-Seabrook itself. The evidence indicates that tidal flushing is rapid, with complete flushing in one or two tidal cycles, so that reproductive products from the Hampton-Seabrook flats will be washed out of the estuary. However, it must be stressed that if there is any threat to successful recruitment of clams to other areas, the threat would be posed by the overcropping and not by the plant.

In connection with backflushing, I note that the effect of backflushing, particularly the effect on the Sunk Rocks area, can to some extent be mitigated by avoiding back-

flushing during adverse meteorological and hydrological conditions. While the Determinations do not expressly require backflushing to be avoided at times of adverse meteorological conditions, I note that Condition I(C)(6) provides that NPDES permits issued from time to time in regard to the discharge will contain such further limitations or be modified to contain such further limitations on the thermal component of the discharge as the results of available information indicate to be necessary to assure the protection and propagation of a balanced indigenous population. I hereby direct the RA to give due consideration to the development of further conditions pursuant to this clause. Specifically, I understand and interpret Condition I(C)(6) as meaning that the NPDES permit as issued for the plant will contain appropriate limitations in regard to the avoidance of backflushing at times of adverse meteorological and hydrological conditions.

### C. Cold Shock

The RA "granted" a finding requested by SAPL that unexpected shutdowns of the diffuser would cause measurable impacts on the balanced indigenous population ("cold shock"), "in view of [his] findings concerning lack of information on the thermal effects of the diffuser on plankton, and for similar reasons. . . ." It is not clear whether the RA meant to find that cold shock would in fact occur or whether he meant simply that he had inadequate evidence to decide the question, but in either event I disagree. Cold shock requires that an organism maintain itself in the warm environment long enough to become acclimated and then be quickly exposed to cold water. As PSCo points out, plankton could not resist the current that flows away from the diffuser; once in the plume, they would experience only

gradual temperature decreases. The high velocity of the discharge should prevent fish from inhabiting, and therefore becoming acclimated to, the plume areas of highest temperature, a prerequisite for cold shock. Because of this velocity, fish are unlikely to become acclimated to a temperature greater than 5° above that to which they would be exposed during shutdown. Generally, a decrease of 15° to 25°F is necessary for fish to be killed by cold shock. Benthic organisms would not be exposed to a rapid temperature decrease because the thermal plume rarely impinges on the bottom and will result in temperature increases on the benthic community of, at most, 1°F or 2°F for short periods of time. Therefore these organisms would not become physiologically acclimated to the plume. The statements made by witness Leger in Exhibit 37 reflect what is generally accepted by fish biologists involved in thermal effects research. He concluded that cold shock would be minimized at Seabrook.

Past instances of cold shock at thermal power plants have occurred predominantly within surface discharge canals. For example, Leger mentioned menhaden kills in the discharge canal of the Oyster Creek plant in New Jersey. Even surface discharges do not always experience cold shock problems. Leger was able to find no record of cold shock at any New England power plant, including those with surface discharges at Brayton Point, Cape Cod Canal, and Pilgrim Nuclear. Submerged discharges such as that proposed for Seabrook are much less likely to cause cold shock fish kills. I conclude on the basis of design and past history in New England that cold shock will be an infrequent and insignificant problem at Seabrook, and that unexpected shutdown of the diffuser will not cause measurable impacts on the balanced indigenous populations.



#### D. *Impact on Wildlife*

The RA concluded that there was no evidence on the question of whether there will be any impact on wildlife, such as birds. This is not completely accurate because there are data on the effect of the plant on the biota on which birds feed. I have concluded elsewhere in this decision that the effect of plant operations on these biota will not be significant. On the basis of this record, I find there is no anticipated effect on wildlife, including birds, from this subsurface thermal discharge. That being the case, I do not believe that PSCo should be required to adduce further evidence in this regard.

#### E. *"No Measurable Rise"*

The RA decided that he had correctly limited the thermal discharge from backflushing and normal discharge to "no measurable rise" at the Inner and Outer Sunk Rocks, since (a) backflushing water might be mixed with water at the "highest naturally occurring temperature" and create "water above the natural high;" (b) operational adjustments can be made to manage the thermal impact; and (c) the information on thermal impacts was inadequate. PSCo urged adoption of a limitation of "no measurable rise above naturally occurring temperature fluctuations of the receiving water in and around the area of the Inner and Outer Sunk Rocks."

On review of the evidence in the record as to the effect of temperatures on the Sunk Rocks biota, I find that the RA's criterion of "no measurable rise" was too stringent. Taken literally, this standard means that a rise of as small as 1/10 of a degree (which would be a "measurable rise") could not be tolerated at the Sunk Rocks. Model studies predict slight temperature rises at the Sunk Rocks during

backflushing. Such rises would not have an impact on indigenous populations sufficient to cause an imbalance.

On the other hand, the standard suggested by PSCo (that the temperature should not exceed naturally occurring ambient temperature fluctuations of the receiving waters in and around the area of the Inner and Outer Sunk Rocks) is ambiguous. It is not clear where the "ambient" temperature fluctuations would be measured (vertically or horizontally) and during what time periods they would be measured.

Both standards seem to be unsuitable for enforcement purposes, since it is not apparent how compliance with either standard could be measured. For instance, if thermistors were placed at the Sunk Rocks there would be no way of telling whether any rise in temperature registered by them was due to natural causes or to the impact of backflushing. The RA should delete the "no measurable rise" criterion and should replace it, if desirable, with some other enforceable criterion appropriate for the protection of the Sunk Rocks biota.

#### F. *Baseline Data*

The RA found that there was inadequate baseline data and that this would hamper later efforts to study the changes wrought by the plant for the purpose of taking corrective action. I agree. I hereby direct the RA to review the report of the technical and scientific panel in this regard with PSCo and to require PSCo to develop a plan to provide adequate baseline data which will be acceptable to the RA.

#### G. *Conclusion*

On the basis of the data in the record, as supplemented pursuant to the Request for Information, and on the recom-

mendation of the panel whose advice I have sought, I conclude that the discharge limitations proposed for the far site will assure the protection and propagation of a balanced, indigenous population of fish, shellfish and wildlife in and on the receiving waters. In coming to this conclusion I have considered the effects of the entire cooling system, including entrapment, entrainment, and discharge.

#### IV. The Intake (316(b))

##### A. Design

After reviewing the evidence in the record on velocity, the RA found insufficient evidence to conclude that the 1 fps velocity proposed for the intake was the best to minimize entrapment, and suggested that diversion or other means of avoiding fish entrapment may be necessary. Velocity is only one of several factors influencing entrapment by intakes. While fish entrapment is reduced as velocity at the intake face is decreased, the design of the structure is also critical. Modifying the conventional velocity cap by extending the upper and lower lips (to obtain a "T" structure) reduces entrapment. Also placement in the water column influences entrapment. Finally, the most important factor is the location of the intake in relation to the location of potentially entrapable organisms. I find that all of these criteria, including intake velocity, have been taken into account in designing the intake structures.

In an ultimate sense it is impossible to optimize velocity, since the optimum velocity for one species at one life stage may not be the optimum velocity for that species at another life stage, or for some other species. At different times of the year different species can be expected to be susceptible to entrapment by the intake. Consequently, designing for a single velocity cannot protect all fish at all times. Moreover, as the RA points out in his I.D., the entire range of

values between 0.5 fps and 1.0 fps will be found within a very short distance from the intake. To attempt to further refine the velocity in this case is unnecessary and not likely to result in any measurable reduction of entrapment loss (which will be negligible in any event).

Moreover, because entrapment will be negligible (as discussed elsewhere herein) I do not believe that the intake structures need be further refined to provide diversion or other means of avoiding entrapment. I note, however, that should this prove to be incorrect, the Determinations require, in Condition II(H), that NPDES permits issued from time to time in regard to the cooling water intake structures must contain such further limitations and requirements as available information indicates to be necessary to minimize adverse environmental impact.

##### B. (1) Location — Entrapment

The RA found that even if the effects of the intake alone (entrainment and entrapment) were considered, the impact on many species was unknown and could be significant. Specifically, the RA found that there was inadequate information on actual migratory pathways in and out of Hampton Harbor, and little evidence of the actual overall abundance of the finfish species in the area potentially impacted, at either the near site or the far site.

It is true that only limited data exist on the migratory pathways of fish to and from Hampton Harbor. However, fish migration is commonly diffuse and not associated with a precise narrow path unless there is some continuous physiographic characteristic for orientation, such as the contour of a significant change in depth. Both the Sunk Rocks and the intake areas are point locations rather than continuous physiographic characteristics, and migrating fish



would not be expected to consistently move through these areas. Rather, they would more likely occur there only through random migratory movements. Consequently neither substantial entrapment nor disruption of migratory movements can be expected. It is highly unlikely that studies of fish migration, which would be very expensive and time-consuming, would yield any useful information with respect to the best location for the intake structures. I cannot therefore conclude that they are required in this case.

Moreover, I believe that the evidence in the record indicates that entrapment is likely to be negligible. That being the case, I cannot conclude that studies of the actual abundance of finfish in the area are necessary.

#### B. (2) Location — Entrainment of *Mya*

PSCo studied the extent to which *Mya* larvae would be entrained by the intake by means of a model. Under PSCo's model the flow of water into the intake is determined and compared with the flow of water in a hypothetical area in the near-shore waters. The flow into the intake is assumed to be a box with a fixed length of 1000' and widths and depths which vary with ambient current speed and density stratification. This "entrainment box" represents the bounding streamlines leading to the intake; all of the larvae in this box are "entrained" per unit time. The number of larvae in the entrainment box is calculated and compared with the number of larvae in a hypothetical volume (used as the assumed habitat of the *Mya* larvae) which is 2½ miles wide and 30 feet deep; the length of this volume is determined by the ambient velocity being considered.

The RA found that the assumption in the model of uniform distribution of *Mya* larvae is unreliable in view of the

known patchiness of larvae. He also found that current speed determines the width of the streamlines of the intake flow in the model and could even lead to repeated exposures to plant-induced stresses; thus, due to greatly varying current levels and patchiness of larvae, actual larval mortality might greatly exceed the predicted 4.6%. The RA found on the one hand that this impact could be potentially severe and on the other hand that it was impossible to estimate what the impact of a 4.6% mortality would be on adult populations.

*Mya* larvae are acknowledged to be patchily distributed; however, if the larvae are looked at over a large enough time and space scale, the effect would tend to be the same as uniform distribution. Over the time and space scales used in PSCo's model (which were reasonable for *Mya*), it is valid to assume that patchiness would tend to become integrated. That being the case, there would be no point in trying to model patchiness because such an effort would not yield significantly different results from the calculations already furnished by PSCo.

The model is based on assumptions which are highly conservative, for various reasons, and thus yields results which are likely to exceed actual mortalities. *Mya* in fact occupy a volume which is longer than the hypothetical *Mya* habitat used in the model; in other words, they occur to the north and the south of the 2½ mile-wide box. Thus, if for instance the model says that 4.6% of larvae are entrained, in fact this is 4.6% of only a portion of available *Mya* larvae.

When the model is run with very slow currents, the percent of larvae entrained rises until 100% entrainment is approached. However, it is unrealistic to assume that, in the hydrodynamic situation present at the intake site, there will be a long period of slow currents. Consequently the

fear expressed by SAPL, namely that under slow current conditions a large percentage of *Mya* would be entrained, is unrealistic; it ignores the tide, wind and density current conditions in the Gulf of Maine. The problem is analogous to that of patchiness. Considering only tidal currents, if a short time period is examined, a slow current and high percentage of larvae entrained are possibilities, but over a longer time period slow currents will alternate with fast currents; these flows will tend to average out to a typical flow. The conditions assumed by PSCo regarding typical flows are reasonable.

Also, the model breaks down at low current speeds because it indicates that water would be entrained from all directions in the Gulf of Maine—in other words, that the intake would function as a drain in the bottom of a basin. This would not in fact happen, and thus the high larval entrainment which the model predicts under such circumstances will not occur.

While the model is a simple one of limited utility, it is sufficient, because of the conservative nature of its predictions. For instance, PSCo found that under different density stratifications and plankton distributions 2.9% to 4.6% of *Mya* would be entrained. The 4.6% figure is in itself conservative because it represents conditions in which *Mya* are oriented toward the bottom of the entrainment box under extreme summer stratification conditions. It is unrealistic to suppose that such conditions would continue for long periods of time, or that *Mya* would be so oriented during the entire period of their journey past the intake. Also the calculations were made for the inshore site which has intake openings approximately 24-31 feet below the surface (30 feet in the model); at the offshore site the intake openings are 41-48 feet below the surface. It is difficult to envisage entrainment over this entire depth. Thus for various

reasons the estimated 4.6% mortality can be expected to be on the high side.

A more sophisticated model could be developed which would take into account tides, wind and the thermohaline circulation, but it is doubtful if the estimate or its predictive value would be significantly improved. A 4.6% reduction in larvae cannot be expected to result in a 4.6% reduction of the adult population because it does not take into account compensatory mechanisms and density-dependent limiting factors. Taking into account both the highly conservative nature of PSCo's model and the post-larval mortality of *Mya*, I conclude that entrainment of *Mya* will have an insignificant effect on adult *Mya* populations.

#### B. (3) Location—Entrainment of Ichthyoplankton

The RA found that it is impossible to conclude whether the near or far site would represent an advantage with respect to entrainment of ichthyoplankton, and that the overall effect of such entrainment on adult populations is unknown.

The far site would offer an advantage with respect to ichthyoplankton since it lies in deeper water. The majority of eggs of many species are found near the surface of the ocean and hence would escape entrainment. Moreover, the far intake site is believed not to be located in the immediate vicinity of unique spawning beds for any species. That being the case, post-larval recruitment of fishes from other areas would reasonably be expected to offset any effects of entrainment.

#### C. Diffuser Functioning as Intake During Backflushing

The RA found the record inadequate with regard to discussion of the effects of the entrapment potential of the



diffuser acting as an intake. Upon review of the record I have concluded that it is not inadequate and that the use of the diffuser as an intake during backflushing is not likely to cause entrapment in any degree more significant than the intake. This is because of four factors:

1. Entrapment problems can result because fish seek shelter near a structure. However, the diffuser risers are small and provide less shelter than the intake structure.
2. During a considerable portion of the backflushing cycle (2½ hours out of a six-hour cycle), the volume of flow is only 38% of the normal flow.
3. The backflush cycle occurs only about 1.8% of the time during the summer and less in winter.
4. The diffuser pipes are not too far from horizontal (20°-25°) and thus, even without velocity caps, the intake will be nearly horizontal.

I note that PSCo is required by Condition II(C) to use an antifouling protective coating on the cooling water intake structure, to discourage growth of organisms which might attract browsing fish which would then be susceptible to entrapment. I direct the RA to consider whether a similar condition should be required with respect to the diffusers to reduce possible entrapment losses.

#### D. Conclusion

I find that the design and location of the intake at the far site and of the diffuser functioning as an intake reflect the best available technology for minimizing adverse environmental impact. In coming to this conclusion I have taken into consideration the effects of the discharge as well.

## V. Other Issues

### A. Applicability of Section 403

NWF argues that the RA's determination to disapprove the Seabrook discharge is independently sustainable under Section 403 of FWPCA. Section 403 prohibits issuance of a permit under Section 402, after promulgation of guidelines established under Section 403(c), except in compliance with such guidelines. Prior to the promulgation of such guidelines, a permit may be issued under Section 402 if the Administrator determines it to be in the public interest. Section 403(c) requires promulgation of guidelines for determining the degradation of the waters of the territorial seas, the contiguous zone, and the ocean, which shall include, among other things, the effect of disposal of pollutants on plankton, fish, shellfish and wildlife; the effect of disposal of pollutants on marine life, including changes in marine ecosystem diversity, productivity, and stability and species and community population changes; other possible locations and methods of disposal or recycling of pollutants; and the effect on alternate uses of the oceans, such as scientific study. There are no currently applicable 403 guidelines, the ones promulgated in 1973 having been revoked (38 F.R. 28613).

PSCo and the Utilities argue that Section 403 does not apply to discharges of heat. This argument runs counter to the express language of FWPCA. Section 403 applies to permits for "discharges"; this is a term of art in the statute which means "a discharge of a pollutant" (§502(6)), and "pollutant" is expressly defined to include heat (§502(6)). The disposal of heat may have an effect on plankton, fish, shellfish, and wildlife, and may result in changes in marine ecosystem diversity, productivity and stability and species and community population changes. In cases where 316(a)

waivers are obtained, Section 403 largely duplicates §316(a); however, in cases where a 316(a) waiver has not been obtained, but 301 or 306 standards apply, Section 403 would not be duplicative.

I believe that, for me to disregard the plain meaning of the statute, there should be clear legislative history indicating a contrary meaning, and that is not the case here. The Conference Report stated that Section 403 regulates "the discharge of pollutants subject to this Act" (which term, as discussed above, includes discharges of heat) from any "outfall sewer" (Legis. Hist. at 177). PSCo urges that the term "outfall sewer" does not include a thermal discharge such as Seabrook's. Though the Conference Committee may have had in mind that Section 403 would regulate principally discharges of industrial and sanitary waste, casual use of the term "outfall sewer" is insufficient to indicate an intent to exclude pollutants other than chemical and sanitary wastes.

The Senate Committees on Commerce and Public Works had competing jurisdictional claims in the areas covered by Section 403 of the Senate version of FWPCA and H.R. 9727, an ocean dumping bill. Senator Magnuson stated that Section 403, coupled with Section 502(n) (which defined "discharges" basically in the same manner discussed above), accurately reflects the agreement of these Committees as to the two bills—that is, the Committee agreed that "the regulation of discharges of pollutants" within the territorial and internal waters of the United States will be governed by the provisions of the Senate version of FWPCA and in areas beyond that "the regulation of transportation for dumping of materials originating in the United States" will be governed by H.R. 9727. (Legis. Hist. at 1380). The Senator carefully distinguished between

regulation of "discharges" and regulation of "dumping." Senator Hollings concurred that "the discharge of pollutants from outfalls, vessels or any other source" within the internal or territorial waters of the United States would be governed by the proposed FWPCA amendments and that "the regulation of such *discharges* will be through a permit program, applying *discharge* criteria provided in Section 403 of the act." (Legis. Hist. at 1381; emphasis added.)

PSCo also argues that because of the "clear complementary relationship" between Section 403 and the ocean dumping statutes it can be inferred that disposition of the same sorts of materials were to be prohibited; since the ocean dumping statute does not prohibit dumping of heat, PSCo argues, therefore Section 403 must not. Leaving aside the question of whether such a mode of statutory interpretation is valid, the short answer is that one would not expect an ocean dumping statute to cover heat because heat is discharged through pipes and is not transported on a vessel for ocean disposal. In conclusion, I believe that Section 403 applies to discharges of heat.

Upon review of the record in this case and of appropriate portions of the Final Environmental Impact Statement issued by the AEC in December, 1974, I have determined that PSCo's requested thermal discharge would be "in the public interest" within the meaning of Section 403(a).

#### B. Motion of PSCo Regarding EPA Brief

On February 14, 1977 PSCo filed a Motion for Enforcement of Administrator's Order or, For Alternate Relief, requesting that the brief of the Environmental Protection Agency be stricken and that the Proposed Findings and Conclusions of EPA Enforcement Division—Region I and EPA, Office of Water Enforcement, be substituted therefore.



The Proposed Findings are in the record and the record indicates the position taken by the Enforcement Division on behalf of the Agency at the adjudicatory hearing. Properly speaking, it is the Agency, not the Enforcement Division, which took part in the proceedings below. On appeal, the Agency determined that its brief was to be filed by its Office of General Counsel. It is for the Agency to determine by whom it will be represented. The motion is denied.

*C. Filing of Reply Briefs and Brief of Governor of New Hampshire*

On February 11, 1977 the Utilities filed a request to file a reply brief, accompanied by that brief. SAPL objects to the filing of the brief and to the manner in which the request was made. It has been past practice of the Judicial Officer to permit the filing of reply briefs as a discretionary matter, though the filing of reply briefs is not specifically authorized in the regulations. The filing of the request concurrent with the brief was specifically authorized by the Judicial Officer in this case. Because of the complexities of this case, I felt it was useful to permit the filing of reply briefs, and accordingly the requests of the Utilities and PSCo in this regard are hereby granted. The brief by the Governor of New Hampshire was timely filed in accordance with the notice granting him permission to file an amicus brief.

*D. Denial of Request for Hearing*

On March 23, 1977 I issued a Request for Information from PSCo and gave the other parties an opportunity to furnish comments on PSCo's submission within 10 days from the date of submission, in affidavit form. I also stated that a hearing with respect to PSCo's submission might be held upon the request of any party upon a showing, among

other things, that there was a genuine and substantial issue of fact for resolution at a hearing and that such factual issue was capable of being resolved by available and specifically identified reliable evidence; I stated that a hearing would not be granted on the basis of mere allegations or denials or general descriptions of positions and contentions.

As mentioned above, materials were received in response to the Request for Information from NHAG, PSCo, EPA and SAPL. SAPL requested a hearing. Upon review of SAPL's request I find that it does not meet the criteria specified in the Request for Information. SAPL has not identified genuine substantial issues of fact for resolution at a hearing by specifically identified reliable evidence. It has merely made general allegations about issues which appear to be adequately dealt with on the record to date. For instance, the accuracy of larval identification was the subject of exhaustive testimony in the hearing below, and SAPL does not indicate that it has new evidence on this point. SAPL does not identify any substantial issue which it has not dealt with, or had the opportunity to deal with, in the case below or in its written submission. I am not persuaded by SAPL's request that a hearing would be of assistance to me in resolving the underlying issues in this case. In view of the need for an expeditious resolution of this case and the failure of SAPL to state a basis for holding further hearings in accordance with the criteria set forth in my Request for Information, I am hereby denying SAPL's request for a hearing.

Accordingly, as indicated above, the Initial Decision of the Regional Administrator is reversed. The Determinations are reinstated, except that Condition I(C)(2) requiring "no measurable rise" at the Inner or Outer Sunk Rocks shall be promptly modified by the RA in accordance with

this decision. I direct the RA to consider also modification of the Determinations to impose additional conditions as mentioned in this Decision.

s/ DOUGLAS M. COSTLE  
Administrator

Dated: June 10, 1977

**A Technical Review Of The 316a and 316b Determination  
In The Instance Of The Seabrook, New Hampshire Application**

**A Report Prepared By A  
U. S. Environmental Protection Agency  
Technical Work Group**

**Prepared From a Technical Review Session Held On  
February 28 - March 3, 1977 in Washington, D. C.**

**March 11, 1977**



### EXECUTIVE SUMMARY

- IN THE VIEW OF THE TECHNICAL PANEL, ADEQUATE INFORMATION EXISTS TO RENDER A SECTION 316 DETERMINATION.
- IF CONSTRUCTED AS DESCRIBED, THE SEABROOK PLANT WOULD HAVE ONLY MINOR IMPACTS ON A LOCALIZED AREA.
- THESE IMPACTS ARE NOT ANTICIPATED TO BE OF SUFFICIENT SCALE OR SCOPE TO IMBALANCE THE ECOLOGY OF HAMPTON HARBOR OR THE GULF OF MAINE.
- THE PROPOSED DESIGN AND COOLING WATER CONFIGURATION, ESPECIALLY THE OFFSHORE INTAKE AND DISCHARGE, APPROXIMATES THE STATE-OF-THE-ART FOR THIS LOCATION AND WILL MINIMIZE OR REDUCE MANY OF THE PROBLEMS THAT HAVE BESET OTHER COASTALLY LOCATED POWER PLANTS.
- BECAUSE OF THE ABOVE, IMPINGEMENT, ENTRAINMENT, AND ENTRAPMENT ARE EXPECTED TO BE MINOR PROBLEMS.
- BENTHIC STUDIES SHOULD BE UNDERTAKEN TO MONITOR POTENTIAL CHRONIC EFFECTS.

### PREFACE

This report is as a result of a request made to the Assistant Administrator for Research and Development to perform a technical review of the decision of the Region I Regional Administrator with respect to the Seabrook 316 determination. Following this request, a technical review panel from the Office of Health and Ecological Effects was constituted in Washington during the week of February 28. The panel members were selected for their expertise in various technical areas indicated by the Judicial Officer from the Office of the Administrator (Ms. Harriet Marple). Curriculum Vitae for these individuals are given as Appendix 1 to this report.

During the week of February 28, the panel assembled in Washington and materials were prepared for distribution to the work group so that the record could be examined and discussed between and among the panel members. The format of this report follows the outline given in the memo (see Page 3). This memo constituted the charge to the panel. Document numbers given in the Literature Cited section follow those assigned in the adjudicatory hearing.

The conclusions and recommendations included herein were developed on the basis of the materials provided by the Judicial Officer; i.e. the hearing transcripts, testimony and materials submitted for the record. Further, these conclusions and recommendations regarding the impact of the Seabrook power plant on the marine environment are specific to Seabrook and cannot be generalized or transferred to other locations or facilities.

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## INTRODUCTION

The record associated with the Seabrook power plant is characterized by a high degree of emotion as well as a plethora of technical detail and scientific issues. At the center of the issue is the question: "How much information is required to render an informed 316 judgment by the Regional Administrator or by the EPA Administrator?" Several specific issues will illustrate the scope and scale of the problem.

No power plant, with an open cycle cooling system especially one which uses water having a high biotic content, can operate without some environmental impact. What must be looked at is the extent, permanence, significance and scale of these impacts. These were the considerations approached by the technical work group in their examination of the Seabrook documentation.

Many of the technical panel members are experienced with thermal effects, have been directly and professionally involved in 316 activities, have worked in similar zoogeographic areas or are familiar with the scientific literature related to thermal effects. Application of this experience to the Seabrook issue in many instances permitted judgments to be made about the validity of specific issues or assertions raised in this instance. In particular, application of the experience was especially useful in weighing various assertions about the inadequacy of, or the need for, certain data. In some cases the RA and certain parties asserted the need for information which is not attainable using state-of-the-art techniques; in other cases they asserted a need for information which, if developed, would not materially clarify the situation.

In an area such as this, judgment must be exercised in the interpretation and assessment of the available data. In



many cases it is necessary or adequate to make projections or extrapolations from the available data. In some cases the available data may not be sufficient to permit a valid projection or extrapolation; the panel did not find this to be so in this case.

#### **CHARGE TO THE TECHNICAL PANEL**

UNITED STATES  
ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
RESEARCH AND DEVELOPMENT

February 25, 1977

MEMORANDUM

TO: Panel Members  
FROM: Harriet B. Marple  
SUBJECT: Seabrook

I. Procedural Background

Public Service Co. ("PSC") wants to build a nuclear electric generating station in Seabrook, New Hampshire which would use once-through cooling. Since the Agency's regulations for "best available technology economically achievable" ("BATEA") issued under the Federal Water Pollution Control Act provide for closed-cycle cooling for such plants, PSC applied to Region I for permission to use once-through cooling under §316(a). This section provides that if an owner of a point source can demonstrate to the satisfaction of the Administrator that the required thermal effluent limitations are "more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge is to be made", the Administrator can impose alternate effluent limitations on the thermal discharge sufficient to assure that this test will be met. (The Administrator has delegated his authority to the Regional Administrators).

Also, under §316(b), the "location, design, construction and capacity of cooling water intake structures" must "reflect the best technology available for minimizing adverse environmental impact."

On June 24, 1975 the Regional Administrator ("RA") issued Determinations in effect approving of once-through cooling for Seabrook on certain conditions, but specifying that the intake should be located in the northeast quadrant of a circle whose center was the easternmost edge of the Outer Sunk Rocks (described further below). On October 24, 1975 the RA issued a determination specifying a location for the intake within that quadrant. (The purpose of the Determinations was to implement an understanding between the Nuclear Regulatory Commission ("NRC") and the EPA regarding their roles in the licensing process for nuclear electric plants and to permit power companies to know in advance, for planning purposes, what the terms of their NPDES permits would be.) Certain environmental groups (referred to herein as "SAPL") requested an adjudicatory hearing on the Determinations. After the hearing, the RA issued a decision revoking the Determinations. PSC has appealed this decision.

Meanwhile PSC had received a construction permit from the Licensing Board of the Nuclear Regulatory Commission (NRC). The Licensing Board determined that closed cycle cooling was unacceptable for Seabrook and authorized construction conditional upon EPA's final approval of the proposed once-through cooling system. PSC began work on the plant before the RA's decision revoking the Determinations came down. I understand that PSC has slowed work on the plant to a virtual standstill since the RA's decision. However, the NRC Appeals Board ruled on January 21 that construction should be stayed because the



Licensing Board erred, as a matter of fact and law, in determining that closed cycle cooling was unacceptable for Seabrook. This ruling was in turn stayed by the full Commission pending a hearing which commenced February 7. On February 8, the Commission voted to permit limited work to continue until February 18, when it was to rule on whether all work must halt.

## II. Factual Background

Seabrook would be built in Seabrook, New Hampshire near the Hampton Harbor estuary, about two miles inland from Hampton and Seabrook beaches, which are on the Gulf of Maine portion of the Atlantic Ocean. Just outside the Hampton Harbor Inlet are two groups of intertidal rocks known as the Inner and Outer Sunk Rocks. (See map attached.) The Seabrook cooling water intake will draw in ocean water at the rate of 824,000 gallons per minute (about 1.2 billion gallons per day) and will use it for cooling purposes. This quantity of water will then be discharged heated to 39° above ambient. (This temperature differential is called the delta-T.) Seabrook will have the highest delta-T of any station now operating. This resulted from a conscious engineering choice: the theory was that since significant numbers of the organisms entrained in the intake water were likely to die, the number of organisms affected would be decreased by decreasing the volume of water used (hence resulting in a higher delta-T).

Seabrook's cooling water intake structures consist of three capped ports, the lower lip of which will be 7' off the bottom. The entrance velocity will be approximately 1 fps.

Seabrook asked that the intake ports be located about 3,000' east of Hampton Beach in water about 38 feet deep. This is referred to herein as the "near site". The RA required that the intake be located about 4,000' northwest

of this site in water 58' deep. This is referred to as the "far site".

The Seabrook diffuser is designed to shoot out the heated water at a fast velocity (15 fps) to assure fast mixing. It consists of 22 discharge nozzles placed along a 1,000' line about 7' off the bottom and 45' below the surface. The diffuser is located about 5,400' east of Hampton Harbor inlet and south of the near site; it shoots the discharge away from the shore.

Biofouling of the intake will be controlled by "back-flushing". In this process the flow is reversed, so that the intake becomes a discharge and vice versa. Water heated to 120° is discharged for a minimum of two hours to kill any organisms that may be growing in the intake tunnel.

The aquatic environment in or near which the intake and discharge will be located was described by the RA as a "biologically rich estuarine and coastal ecosystem which produces and supports a great variety of organisms," some of known importance to man. The estuary is used as a feeding, spawning and/or nursery ground by about 20 species of finfish which migrate between the Gulf and the estuary through the Hampton Harbor inlet.

The regulations provide that the RA may make a 316(a) determination based on a showing with respect to "representative important species" ("RIS"). The RIS list approved by the RA contained sixteen species. The larvae of one of these, *Mya arenaria* (the soft-shelled clam), was used in effect as an indicator for effects on larvae generally. Thus there was an effort to predict the effect of the intake on *Mya* larvae. Adult *Mya* are found primarily in estuaries, including the Hampton Harbor estuary, where they have recreational importance. During the summer they spawn and release reproductive products into the water.

The larvae remain in the water for up to 30 days, depending on the temperature of the water, and then metamorphose and settle to the bottom as spat which will eventually grow into adult clams if the environment is suitable.

**III. Set forth in IV below is a summary of the RA's findings in his Seabrook decision. You are asked to review the record and answer the following questions, based upon the record:**

1. Was the RA correct in his findings regarding the inadequacy of the record to make a 316(a) determination or a 316(b) determination? Did the RA demand an unreasonable or unattainable degree of certainty on any issue?
  - (a) Does the record cover all appropriate areas? If not, what additional studies would be necessary? What would be the approximate time and cost of such studies?
  - (b) To the extent that you agree with the RA's findings that the record was inadequate, what types of studies would be required to correct the inadequacy? What would be the approximate time and cost of such studies?
  - (c) Is the record inadequate in any material sense not mentioned by the RA? If so, what studies would be required to correct the inadequacy? What would be the approximate time and cost of such studies?
  - (d) Was there any material instance in which the studies in the record were adequate, but invalid conclusions were drawn from them? What conclusions could have validly been drawn from such studies?
2. If the record was adequate to permit the RA to make a reasoned judgment as to whether the proposed

thermal discharge would assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife, what effects, if any, on such population do you believe would be caused by the discharge?

**IV. The RA in his decision came to the following conclusions:**

1. The impact on indigenous populations cannot be reasonably predicted from the evidence in the record (especially considering the potential effects of both intake and discharge) because there is inadequate examination of the effect of the turbulent, heated discharge on planktonic forms, though much attention has been paid to the effect of the intake in this regard. In particular, the RA found that (a) the data on temperature tolerances of RIS consisted in some cases of studies that did not examine impacts on all necessary life stages; (b) for some RIS little or no relevant data were presented; (c) most of the studies involved gradual temperature increases or exposures after acclimation at temperatures not encountered at Seabrook and are of little relevance to the question of exposure to a quick temperature increase of up to 40°; (d) some studies cited note lethal temperature limits which are below the maximum temperature of the Seabrook discharge even though these studies generally involved gradual temperature increases; (e) there is little discussion of sublethal effects (such as injury or interference with reproductive cycles) or indirect effects (net increase or decrease in adult stages due to direct lethal or sublethal effect on an earlier life stage of a food or predator species); and (f) neither PSC nor the Enforcement Division had studied or evaluated the in-



direct thermal impact on the benthic community including the impact on the pelagic larvae of certain benthic species.

2. There is no useful information in the record concerning the volume of water which would be entrained in the thermal discharge and thus no way of estimating the numbers of planktonic organisms, for example, which would be exposed to the heated water. Also, there is little evidence on the present size and stability of many populations potentially affected by the plant. Inadequate baseline data would hamper later efforts to study the changes wrought by the plant for the purpose of taking corrective action.
3. Together, the lack of data on species thermal tolerances and the lack of information on numbers of organisms exposed make even an educated guess as to overall direct impact impossible.
4. Unexpected shutdowns of the diffuser would cause measurable impacts on the balanced indigenous population ("cold shock"). (The RA may have meant simply that there is inadequate information to determine whether cold shock would occur.)
5. The record does not adequately discuss the impact of backflushing. There is no discussion of the effects of the backflushing or of the entrapment potential of the diffuser acting as an intake.
6. It is improper to compare annual natural temperature ranges (e.g., 40-60°) with temperature increases (e.g., 10° above ambient) caused by the cooling water discharge and then conclude that the latter are insignificant because they are within the former.
7. He (the RA) had correctly limited the thermal discharge from backflushing and normal discharge to

"no measurable rise" at the Inner and Outer Sunk Rocks, since (a) backflushing water might be mixed with water at the "highest naturally occurring temperature" and create "water above the natural high"; (b) operational adjustments can be made to manage the thermal impact; and (c) the information on thermal impacts was inadequate.

8. There was no evidence as to whether there will be any impact on wildlife, such as birds.
9. There was insufficient evidence to conclude that the 1 fps velocity of the intake was best to minimize entrapment. Additional study is necessary, with emphasis on the optimum velocity and on fish diversion techniques and other means of avoiding entrapment problems, before any conclusion on "optimum design" can be reached. There was conflicting evidence as to whether a .5 fps velocity would be preferable. It was not clear how migrating species would react to the current — whether they would tend to swim into the current rather than away from it.
10. Even if the effects of the intake alone (entrainment and entrapment) were considered, the impact on many species populations was unknown and could be significant. Specifically, there was inadequate information on actual migratory pathways in and out of Hampton Harbor, and little evidence of the actual overall abundance of the finfish species in the area potentially impacted. This inadequacy of information exists for both the near site and the far site.
11. Entrainment of phytoplankton and zooplankton is not a problem because these species can reproduce rapidly and there is an unlimited supply.

12. Though there are certain deficiencies in the Mya studies, nevertheless their general conclusions — that Mya are relatively wide-spread in inshore coastal waters and that density decreases with increasing distance from shore — are supported by the evidence.
13. The assumption in the model of uniform distribution is unreliable in view of the known patchiness of larvae. Also current speed determines the width of the streamlines of the intake flow in the model and could even lead to repeated exposures to plant-induced stresses. Thus, due to greatly varying current levels and patchiness of larvae, actual larval mortality might greatly exceed the predicted 4.6%; the impact of this mortality is potentially severe. Even if the model were useful in estimating the potential impact of the plant, it is impossible to estimate what the impact of, say, a 4.6% mortality will be on adult populations.
14. It is impossible to conclude whether the near or far site would represent an advantage with respect to entrainment of ichthyoplankton; the overall effect of such entrainment on adult populations is unknown. Locating the intake substantially further offshore would decrease entrainment of inshore species to a greater extent than it would increase entrainment of the more disperse offshore species. The assumption of a coastal band of relatively richer larval abundance is a reasonable one. It is likely that this band is from two to three miles wide and that the outer edge tapers off.

- V. **This matter is highly confidential and should be discussed only with other panel members.**

### III. Q.

*The charge to the panel broadly asks whether the Regional Administrator was correct in his findings regarding the inadequacy of the record to make a 316(a) or (b) determination.*

### III. A.

In the view of the technical panel (with the exception of a single issue: backflushing) a sufficiency of information to make such determinations existed so that valid 316(a) and (b) determinations could be rendered. The single qualification in this respect is the amount and quality of available information concerning backflushing. Specific portions of this process are discussed in questions 1 through 14 in IV.

The second part of question III asks that, if the record is adequate, what effects, if any, would be considered probable. These effects are discussed under questions 1 through 14 in section IV.

In the judgment of the technical panel there will be environmental effects from the Seabrook operation, however, these will be limited to a small area of the Gulf of Maine in the immediate vicinity of the Seabrook offshore structures. It is also believed that the environmental conditions within and proximal to Hampton Harbor will be such as to allow the protection and propagation of a balanced indigenous population.

Two further questions are addressed in question III. These deal with the inadequacy of data or studies related to Seabrook, and with the question of whether additional information should be required by the Administrator or the



Regional Administrator. The specific adequacy or inadequacy of the studies is discussed in questions 1 through 14. The second question calls for additional studies. The technical panel feels that a monitoring program, as discussed under section IV number 2, would be highly desirable.

With respect to the first question, it should be noted that there are insufficient modelling data available to estimate the impact of locating the intake at the inshore site. This is immaterial because adequate data exist for a decision assuming the location at the offshore site. Also, the Panel believes that the offshore site is much preferable to the inshore site because:

- (1) There will be less likelihood of thermal impact on the Outer Sunk Rocks.
- (2) The inshore site is located closer to presumed migratory pathways in and out of the estuary.
- (3) Entrainment of meroplankton of coastal species will be less at the offshore site. This is expected to compensate for the possibility of an increased entrainment of pelagic plankton.
- (4) Outcroppings and the proximity of the inshore site to the Outer Sunk Rocks will attract fish to this site and increase entrapment.

#### IV. Q.

1. *The impact on indigenous populations cannot be reasonably predicted from the evidence in the record (especially considering the potential effects of both intake and discharge) because there is inadequate examination of the effect of the turbulent, heated discharge on planktonic forms, though much attention had been paid to the effect of the intake in this regard. In particular, the RA found that*

*(a) the data on temperature tolerances of RIS consisted in some cases of studies that did not examine impacts on all necessary life stages; (b) for some RIS little or no relevant data were presented; (c) most of the studies involved gradual temperature increases or exposures after acclimation at temperatures not encountered at Seabrook and are of little relevance to the question of exposure to a quick temperature increase of up to 40°; (d) some studies cited note lethal temperature limits which are below the maximum temperature of the Seabrook discharge even though these studies generally involved gradual temperature increases; (e) there is little discussion of sublethal effects (such as injury or interference with reproductive cycles) or indirect effects net increase or decrease in adult stages due to direct lethal or sublethal effect on an earlier life stage of a food or predator species); and (f) neither PSCo nor the Enforcement Division had studied or evaluated the indirect thermal impact on the benthic community including the impact on the pelagic larvae of certain benthic species.*

#### IV. A.

1. The Draft 316(a) Technical Guidance — Thermal Discharges (September 30, 1974) discusses the need for thermal effects data for the various life stages of Representative Important Species (RIS) of fish, shellfish, and wildlife. In many situations such data are necessary to determine the effects of the heated effluent on the structure and function of the marine ecosystem. In these situations it would be the responsibility of the Applicant to provide available data and conduct appropriate studies to generate critically needed information.

Analogy and comparison to other power plants in coastal areas does serve to allow estimation of probable effect on

RIS and indigenous populations. Consideration of the Seabrook site is also benefited by a general knowledge of some well-studied and widely-distributed species such as *Mya arenaria* or characteristic zooplankton species assemblages. Thus, while it is true that the applicant did not perform exhaustive studies on all RIS it is not true that nothing is known about these species, their biology, distribution or value to the ecosystem.

Exact determination of the species distribution, abundance and relationship among components of the ecosystem might exceed the present state-of-the-art, especially for certain types or organisms. The relationships between and among the species comprising a given assemblage (i.e. "population" as defined in §316a) such as the "benthic" community or the "phytoplankton" community are extremely difficult to define and elaborate. This difficulty increases as a function of the number of the components to be considered. Thus, it is vastly easier to understand or model a community of 5 species which may interact with each other than one composed of 20 species. The potential for interaction increases as a factorial of the number of species and the number of ways they can interact. As a generalization, species have been selected for study because of their economic or ecological importance expressed either as numerical dominance or wide distribution. Consequently, many species which are uncommonly collected or infrequently encountered have not been studied to the level that permits defining their role in the ecosystem. Also it would be difficult to evaluate or assign significance to selective mortality or morbidity estimates.

A number of Seabrook design features such as high  $\Delta T$ —low water volume system maximizes thermal exchange at the expense of the entrained biotic component,

however, the total volume circulated is very much less than would be required with a smaller  $\Delta T$ . The high speed discharge obviates the discharge canals which, in some instances, have become little more than killing chambers. Similarly, the offshore intake design will offer advantages compared to traditional intakes which can, by their design, increase fish entrapment.

The proposed Seabrook Nuclear Station would employ a multiport, high-velocity diffuser which is designed to minimize exposure of organisms to high temperature regions. Compared to traditional configurations, this design will result in a smaller area or volume of water impacted. The offshore discharge location will further minimize the impact. The net effect is that significant environmental impacts cannot be anticipated in the area affected by the discharge, and the effects on the Gulf of Maine as a whole will be so small as to be essentially unmeasurable (EPA-74). Specifically, the 4°F surface isotherm under full load conditions would encompass a maximum area of about 10 acres (PSC Brief p. 62). Thus, the Seabrook discharge is expected to affect only a small portion of the waters, in and proximal to, Hampton Harbor. Since the data available in the record allows us to conclude that the "balanced indigenous population" in and proximal to Hampton Harbor will not be adversely affected, it is not necessary to have thermal effects data on *all* life stages of *all* RIS. In this instance, we concur with the statement (EPA Brief, February 7, 1977, p. 43) "Generally, the less the magnitude of the risk the less certain the evidence should have to be in order to allow the risk and vice versa." For example, if either the proposed discharge or intake sites were within an enclosed area (such as Hampton Harbor), comprehensive and complete thermal effects data on appropriate RIS would be necessary.



## IV. Q.

2. a) *There is no useful information in the record concerning volume of water which would be entrained in the thermal discharge and thus no way of estimating the numbers of planktonic organisms, for example, which would be exposed to the heated water. b) Also, there is little evidence on the present size and stability of many populations potentially affected by the plant. c) Inadequate baseline data would hamper later efforts to study the changes wrought by the plant for the purpose of taking corrective action.*

## IV. A.

2. a) EPA Exhibit #74 can be used to estimate plume entrainment volumes at a distance of 1,500 ft. from the diffuser axis. Dilution rates at this distance are on the order of ten to one, according to this reference. Thus using data on the record on the density of the plankton (PSC 28 & 34), the total number of plankton organisms entrained in the plume can be crudely estimated. However, such estimates (or even more accurate estimates) would not be useful in evaluating the overall impact of the discharge on the population of all plankton in and proximal to Hampton Harbor due to the small volume impacted relative to the total ecological space available, rapid regeneration times and recruitment from other areas. Entrainment at the discharge will occur to some extent; however, the effects are not anticipated to be significant. The limiting function here would appear to be the size of the plume which contains water of sufficient temperature to shock or kill organisms. Relative to the water mass available this is not anticipated to be a significant ecological impact.

b) We believe the record is adequate to conclude that only a very small segment of the local RIS populations will

potentially be affected by the plant. It, therefore seems unnecessary to require rigorous information on the population and stability of these species.

c) We share the Regional Administrator's conclusion that the biological baseline data are inadequate for an accurate analysis of changes which may occur in response to the plant activities (R.A. Decision, p. 53). Such data must be collected before the plant begins operation, however, it is not necessary for quantitative baselines to be established for all community types.

The benthos seems the most appropriate assemblage for a "before and after" comparison because; (1) benthic organisms tend to be permanent residents of a local area, as opposed to transient fish and plankton populations, and (2) most members of the macrobenthos are relatively long-lived and thus sensitive to chronic impacts of the plant. Quantitative baselines for the macrobenthos retained on a 1.0 mm screen should be established at the Outer Sunk Rocks, the intake site, the discharge site, and at suitable reference stations.

Benthic surveys conducted by Normandeau Associates, Inc. (EX.22, EX.76) are inadequate for two major reasons:

1. Collections at the far intake site were restricted to a single survey and collections at the discharge site were only made over a three-month period. In order to assess seasonal and annual variations, all stations must be sampled at least once every three months for a two-year period.

2. Sampling techniques varied and thus quantitative comparisons are impossible. Five replicate 0.06 m<sup>2</sup> quadrats were sampled at the intake site, but only two 0.25 m<sup>2</sup> quadrats were sampled at the discharge site.

We recommend that the Applicant be asked to submit a quantitative benthic sampling design for approval by EPA.

This design should include measurement of the population dynamics of *Mya arenaria*. Collections should be made for at least two years before and two years after the initiation of the plant operation.

#### IV. Q.

3. *Together, the lack of data on species thermal tolerances and the lack of information on numbers of organisms exposed make even an educated guess as to overall direct impact impossible.*

#### IV. A.

3. Data do exist on the density of benthic, fish, and planktonic communities (PSC 22, PSC 25, PSC 27, PSC 30, PSC 32, and EPA 76). The number of organisms potentially affected can be roughly estimated on the basis of the Alden Research Laboratory study of the spacial distribution of isotherms (EPA 74). See IV. 2. above.

There is little information in the record on the thermal tolerances of marine organisms exposed to the specific temperature fluctuation associated with the Seabrook operation. However, the scientific literature does contain many references to the thermal sensitivity of members of the local biota. Given the very small area to be impacted with a  $\Delta T$  greater than 5°F, it seems reasonable to conclude that local indigenous populations will not become unbalanced. Also see IV. I. above.

#### IV. Q.

4. *Unexpected shutdowns ("cold shock") of the diffuser would cause measurable impacts on the balanced indigenous population. (The RA may have meant simply that there is inadequate information to determine whether cold shock would occur.)*

#### IV. A.

4. Cold shock is a biological phenomenon which occurs naturally in the Great Lakes and around power plants which have been accidentally or intentionally shut down. When fish are attracted to and acclimated to a heated plume and the source of heat is removed, the fish are subjected to a rapid decrease in temperature. If this decrease is sufficiently great, fish can be killed. Generally a decrease of 15 to 25°F is necessary for this fish kill to occur. (Draft 316(a) Technical Guidance-Thermal Discharges, Sept. 30, 1974 p. 115).

The statements by Mr. Robert Leger (EPA 37, p. 21-23) reflect what is generally accepted by fish biologists involved in thermal effects research. He concluded that cold shock danger at the Seabrook Nuclear Station would be minimized because:

1. Benthic fish would not be exposed to a rapid temperature decrease since the thermal plume rarely reaches the bottom and these fish would not become physiologically acclimated to this plume.
2. The high velocity of the discharge should prevent fish from inhabiting, and therefore becoming acclimated to, the plume areas of highest temperature, a prerequisite for cold shock.
3. Because of this velocity, fish are unlikely to become acclimated to temperature more than 5°F above that to which they would be exposed during shutdown. As stated earlier mortality would generally occur only after a 15-25°F decrease.

Past instances of cold shock at thermal power plants have occurred predominantly within surface discharge canals. For example, Leger (EPA #37 p. 22) mentions menhaden



kills in the discharge canal of the Oyster Creek Plant in New Jersey. Even surface discharges do not always experience cold shock problems. For example, Leger (EPA #37, p. 22) can find no record of cold shock at any New England power plant, including those with surface discharges at Brayton Point, Cape Cod Canal, and Pilgrim Nuclear.

It is recognized that the characteristics of submerged discharges such as the one proposed at Seabrook, are much less likely to cause cold shock fish kill; the same should be true of biotic organisms.

#### IV. Q.

3. *The record does not adequately discuss the impact of backflushing. There is no discussion of the effects of the backflushing discharge or of the entrapment potential of the diffuser acting as an intake.\*\**

#### IV. A.

5. Frequency and duration of occurrence of onshore currents is discussed in EPA #62, pages 3 and 4. The probability of joint occurrence of onshore currents and backflushing operation is very low. The Company intends to avoid backflushing during particularly adverse onshore current conditions of long duration.

Model studies presented in EPA #62 show "worse case" conditions for the offshore intake. Test No. 208 shows maximum temperature increases of 2 to 3°F at the Outer Sunk Rocks. Test No. 215 of PSC 13 show maximum temperature increases of 3 to 4°F. The duration of time that

\*\*NOTE: additional information concerning the above will be requested of the Applicant. Upon receipt, this information will be further evaluated by the technical group.

temperature increases of 2 to 4°F might occur does not exceed four hours for each backflushing operation.

The character of the thermal plume around the intake resulting during backflushing operation is described by the backflush cycle given in EPA #62 Attachment A. This backflush cycle gives specific relationship of amount of water circulated and its temperature rise. The maximum temperature of 120°, corresponds to 38% of normal cooling water of 824,000 GpM. At 4.7 hours after the start of the cycle, and for the duration of 1.3 hours before the cycle ends, the full plant flow is re-established, causing rapid decrease in the temperature dropping from 120°F to 80°F. The impact of that is shown in Time 6 hr. of Test No. 208. At Time 7 hr. of the same test, the plume is shown to have disintegrated with no high-temperature pockets greater than 4°F appearing. It is thus unlikely that the plume at the end of backflush cycle could raise the temperature in the Sunk Rock area further before it is completely dissipated.

There are several considerations that indicate using the diffuser as an intake during backflushing is not a problem.

- (1) Entrapment problems can result because fish seek shelter near a structure; the diffuser risers are small and provide less of a shelter for that purpose than the intake structure.
- (2) The volume of flow is 38% of the normal flow during 2.5 hrs. of the 6 hr. cycle.
- (3) The total duration of backwash cycle is 6 hours and during the summer, it takes place every 336 hours, i.e., 1.8% of the time (see EPA #62 p. 4).
- (4) The diffuser pipes are almost horizontal and thus the intake velocity will be nearly in a horizontal plane.

During backflushing for fouling control, heated effluent will be discharged from the intake structure (offshore location). This plume under occasional meteorological conditions, could cause up to 3-4°F rise for about 3-6 hours twice each month around the Outer Sunk Rocks. Such small increases for such short time periods should result in no biologically significant lethal or sublethal effects on the communities in this area.

There is no information available on the vertical temperature structure of the backflush plume, and therefore the three-dimensional plume structure cannot be developed from the information in the record. Hence, precise estimates of exposures of plankton and other organisms to the various temperature regions of the plume cannot be made, and the effect of backflushing cannot be estimated. In this regard the RA correctly found the record inadequate.

#### IV. Q.

6. *It is improper to compare annual natural temperature ranges (e.g., 40-60°) with temperature increases (e.g., 10°) above ambient caused by the cooling water discharge and then conclude that the latter are insignificant because they are within the former.*

#### IV. A.

6. The RA is correct in this statement. A  $\Delta T$  can be within the annual temperature range and still have a substantial impact by increasing maximum natural temperature beyond the physiological tolerance zone of many marine species. This concept is discussed in EX. 3, page 4. The reference given by the RA (EX 13, p. 5-6) concerns temperature ranges over a tidal cycle rather than annual temperature ranges.

The backflush plume  $\Delta T$  and the natural temperature fluctuation are not necessarily referenced to the same base temperature and the actual temperature increase may therefore exceed the natural daily maximum. Whether such an increase is unacceptable is discussed in the answers to questions IV. 5 and 7.

#### IV. Q.

7. *He (the RA) had correctly limited the thermal discharge from backflushing and normal discharge to "no measurable rise" at the Inner and Outer Sunk Rocks, since (a) backflushing water might be mixed with water at the "highest naturally occurring temperature" and create "water above the natural high"; (b) operation adjustments can be made to manage the thermal impact; and (c) the information on thermal impacts was inadequate.*

#### IV. A.

7. Model studies predict slight temperature changes at Sunk Rocks during backflushing. As discussed in IV. 5 above, no biological impact is expected from the backflushing operation, especially when the Company does not backflush during adverse meteorological conditions. The temperature elevation at the Sunk Rocks during normal operations is predicted to be even less than that during backflushing; thus, no biological impact at the Sunk Rocks is anticipated. Therefore, it is unreasonable to require "no measurable rise" at the Inner and Outer Sunk Rocks. In addition, the Company's recommendation "not to exceed naturally occurring ambient temperature fluctuations" is not specified. We are unclear as to its meaning. Therefore, either recommendation provides an unenforceable permit requirement.



(a) O'Brien (EPA #40, RA Reference 93) evaluates the impact of backflushing on the Outer Sunk Rocks, including an assessment of the physical model data. He concludes no adverse biological impact.

(b) The Company can modify its backflushing schedule to account for adverse meteorological conditions and thus reduce the exposure of the Sunk Rocks to the backflush effluent during onshore currents.

(c) See IV. 5.

#### IV. Q.

8. *There was no evidence as to whether there will be any impact on wildlife, such as birds.*

#### IV. A.

8. We concur with the conclusion of the Regional Administrator (RA's I.D. P. 55) that there was no evidence on the question of whether there will be any impact on wildlife, such as birds. The second statement to which he refers (PSC 28, p. 110) simply stated that plankton biomass is being converted to biomass of fish, birds, or benthic invertebrates. Since we conclude that holoplankton entrained or subjected to the turbulent heated discharge (zoo- and phytoplankton) are not likely to be adversely affected, it is unlikely that there would be any conceivable impact at the top of the food chain.

#### IV. Q.

9. *There was insufficient evidence to conclude that the 1 fps velocity of the intake was best to minimize entrapment. Additional study is necessary, with emphasis on the optimum velocity and on fish diversion techniques and other means of avoiding entrapment problems, before any*

*conclusion on "optimum design" can be reached. There was conflicting evidence as to whether a .5 fps velocity would be preferable. It was not clear how migrating species would react to the current — whether they would tend to swim into the current rather than away from it.*

#### IV. A.

9. The state-of-the-art is insufficient to determine the optimum intake velocity. In deciding the merits of 1.0 fps vs. 0.5 fps intake velocity, it must be recognized that velocity is only one of several factors influencing entrapment by intakes. Smith (PSC 21, pp. 18-22) provides a review of research on the design and effectiveness of intake velocity caps. While fish entrapment is reduced as velocity at the intake face is decreased, the design of the structure is also critical. Modifying the conventional velocity cap by extending the upper and lower lips (i.e., to obtain the "T" structure) reduces entrapment by 30-40% with the same velocity. The present intake design for Seabrook is similar to the "T" structure in terms of entrapment potential. Also, physical factors such as depth and currents influence entrapment by intakes. Finally, the most important factor is location — that is the location of the intake in relation to the location of potentially entrapped organisms. At any given location, one can expect to encounter a variety of fish species, with a variety of life stages occurring over time. This means that there will be a variety of swimming speeds represented. Thus, designing an intake for a single velocity cannot protect all the fish in the vicinity.

We believe that the present intake design (1 fps) represents the engineering and biological state-of-the-art for this site and that further study would not provide a design which would substantively reduce entrapment losses.

## IV. Q.

10. *Even if the effects of the intake alone (entrainment and entrapment) were considered, the impact on many species populations was unknown and could be significant. Specifically, there was inadequate information on actual migratory pathways in and out of Hampton Harbor, and little evidence of the actual overall abundance of the finfish species in the area potentially impacted. This inadequacy of information exists for both the near site and the far site.*

## IV. A.

10. We agree that only limited data exist on the migratory pathways of fish to and from Hampton Harbor and also that entrapment of fishes may occur. Nevertheless there have been substantial studies performed on fish migratory behavior; some of these have been done at power plant sites. Generally, these studies suggest that fish do not migrate consistently over time within a narrow range (path) through a waterbody. Over time their movements are relatively diffuse in situations where there are no discrete physiographic characteristics to which they might associate or orient. Since no such characteristics occur near the proposed offshore intake location, we would not expect substantial entrapment at the site nor would we expect the disruption of migratory movements.

Because of its proximity to the Sunk Rocks and subtidal rock outcroppings, the near short intake site has a greater habitat diversity than the offshore intake site. This habitat diversity should attract a greater abundance and variety of fishes. The inshore site thus has a greater potential for entrapment loss than the offshore site. Also, the inshore site is located closer to the Hampton Harbor inlet than the offshore intake. Even though migratory patterns in this area are diffuse, the inshore intake is closer

to a greater concentration of fishes migrating in and out of the estuary and thus should have a greater impact on migratory pathways than the offshore intake location.

Additionally, the burden of uniquely determining migrating pathways for some or all fish species seems an unreasonable requirement given the time, expense and the limited potential ability of the data to be developed. An occasional group of fish might approach the structure on their route to spawning, but it is unlikely that such events would result in significant entrapment loss of such a scale as to impact the local population of a given species. The inshore intake site, because it is closer to the presumed pathways of coastally migrating fish would probably have a greater impact on fish migrating as well as entrapment.

## IV. Q.

11. *Entrainment of phytoplankton and zooplankton is not a problem because these species can reproduce rapidly and there is an unlimited supply.*

## IV. A.

11. We agree that the reproductive capacity of holoplankton is more than sufficient to offset the entrainment losses of phyto-and zooplankton (R.A. Decision, pp. 65-66).

## IV. Q.

12. *Though there are certain deficiencies in the *Mya* studies, nevertheless their general conclusions — that *Mya* are relatively widespread in inshore coastal waters and that density decreases with increasing distance from shore — are supported by the evidence.*

## IV. A.

12. Data given in EX. 76 does support the conclusion that *Mya* larvae are distributed within a near shore coastal



band and that their density tends to decrease with distance from shore. This is not unexpected since the soft-shell clam is considered an estuarine species characteristically distributed in salinity ranges of less than full strength sea water.

#### IV. Q.

13. *The assumption in the model of uniform distribution is unreliable in view of the known patchiness of larvae. Also current speed determines the width of the streamlines of the intake flow in the model and could even lead to repeated exposures to plant-induced stresses. Thus, due to greatly varying current levels and patchiness of larvae, actual larval mortality might greatly exceed the predicted 4.6%; the impact of this mortality is potentially severe. Even if the model were useful in estimating the potential impact of the plant, it is impossible to estimate what the impact of, say, a 4.6% mortality will be on adult populations.*

#### IV. A.

13. There are several questions regarding larvae identification, patchiness and the utility of the models used to compute larvae entrainment. Patchiness is a non-random phenomenon which can be generated by several different mechanisms such as vertical migration, converging and diverging currents, etc. A random distribution of plankton would tend towards a smooth distribution in time and space. While it is true that patchiness would allow for very high concentrations on occasion, it is also true that very low concentrations could also occur. It is not clear what advantage would be gained by an attempt at modeling patchiness since this is really a problem of what time and space scales are of interest. Integrating over larger

space scales and longer time periods has a tendency to smooth out patchy phenomena. The assumption of a uniform larva density distribution over a large area ( $2\frac{1}{2}$  miles) and a long time (30 days larvae development time), for the purpose of estimating probable effect, is reasonable (PSC 28). For other species, these numerical assumptions would, of course, differ.

There is some question regarding taxonomic identification, i.e., other clam species closely resemble *Mya* and may be misidentified in plankton collections. Hence the data on their offshore distribution could be in error. The data, aside from the contention of misidentification, do suggest a trend of decreasing *Mya* densities offshore but there is not a consistent decrease than can be observed with time. It is believed that collection of further *Mya* larvae data would be unproductive, because the loss estimates based on all the modeling and drifter studies indicated very conservative losses, i.e., losses that are probably overestimates of actual mortality.

The model theory developed in PSC 28 with regard to potential flow and streamlined width and direction is insufficient to provide a complete assessment of the adequacy of the mortality model. Assuming its correctness, however, the main utility appears to be in comparing different vertical plankton distributions at *only* intermediate current speeds. The latter components, speed and distribution, may affect mortality estimates. The SAPL 2 model, which makes no allowance for horizontal or vertical distribution, agrees with the model described in PSC 28 only at intermediate speeds — actually one can obtain any number one wishes with the SAPL 2 model simply by varying the width component of the model. The assumptions underlying SAPL 2 do not appear to be founded in reality while

those underlying PSC 28 appear more reasonable since they attempt to account for real world conditions. In summary, the estimate of 4.6% mortality is felt to be a highly conservative figure; a more sophisticated model could be imposed which could take into account tides, winds and the thermohaline circulation but it is doubtful if the estimate or its predictive value would be significantly improved.

Larvae of *Mya* settle in densities much greater than the final density of adult populations. Postlarval mortality is due in part to intraspecific competitions. It is therefore unlikely that a 4.6% reduction in larva density at the settling stage would result in a significant decrease in adult densities.

#### IV. Q.

14. *It is impossible to conclude whether the near or far site would represent an advantage with respect to entrainment of ichthyoplankton; the overall effect of such entrainment on adult populations is unknown. Locating the intake substantially further offshore would decrease entrainment of inshore species to a greater extent than it would increase entrainment of the more disperse offshore species. The assumption of a coastal band of relatively richer larval abundance is a reasonable one. It is likely that this band is from two to three miles wide and that the outer edge tapers off.*

#### IV. A.

14. The far site should offer an advantage with respect to ichthyoplankton entrainment. The majority of eggs of many species are found near the surface of the ocean (EX. 37, p. 19). The far intake site lies in deeper water and will therefore have a lesser effect on eggs which are contained

in the surface layer. The panel believes that movement of the intake from the inshore site, even a relatively short distance (4,000 ft.), to the offshore site will reduce the entrainment of ichthyoplankton of inshore species. However, the intake would still be located in a coastal band of high larval abundance relative to concentrations further offshore.

The effect of ichthyoplankton entrainment and subsequent mortality on adult populations is difficult to predict. The intake site is not known to be located in the immediate vicinity of unique spawning beds for any species (EX. 37, p. 18). Post-larval recruitment of fishes from other areas would reasonably be expected to offset any effects of entrainment on the density of local adult populations. We do not believe that entrainment at the far intake site will disrupt the natural population dynamics of any fish species.



## LITERATURE CITED

- "DRAFT 316(a) TECHNICAL GUIDANCE — THERMAL DISCHARGES"; Water Planning Division, Office of Water and Hazardous Materials; Environmental Protection Agency; September 30, 1974
- "BRIEF OF APPLICANT" filed on behalf of the Public Service Company of New Hampshire, et al.; by Ropes & Gray; January 6, 1977
- "BRIEF OF ENVIRONMENTAL PROTECTION AGENCY" filed on behalf of the Environmental Protection Agency by its General Counsel; February 7, 1977
- "INITIAL DECISION" filed by the Regional Administrator of Region I; November 11, 1976
- SAPL 2 "TESTIMONY OF BERRIEN MOORE, III"
- SAPL 3 "TESTIMONY OF ROBERT A. CROKER"
- PSC 13 "TESTIMONY OF RUSSELL B. MACPHERSON"
- PSC 21 "REBUTTAL TESTIMONY OF BRUCE W. SMITH"
- PSC 22 "THE BENTHOS INHABITING THE AREA OF THE PROPOSED LOCATION OF THE SEABROOK STATION INTAKE"; By Normandeau Associates, Inc.; Bedford, New Hampshire; June 1975
- PSC 25 "PLANKTON DISTRIBUTION IN THE ESTUARY AND COASTAL WATERS IN THE VICINITY OF HAMPTON-SEABROOK, NEW HAMPSHIRE"; By Normandeau Associates, Inc.; New Bedford, New Hampshire; June 1973
- PSC 27 "FINFISH ECOLOGY INVESTIGATIONS AT THE HAMPTON-SEABROOK ESTUARY, NEW HAMPSHIRE AND ADJOINING COASTAL WATERS, 1973-74"; By Normandeau Associates, Inc.; Bedford, New Hampshire
- PSC 28 "THE IMPACT OF ENTRAINMENT BY THE SEABROOK STATION"; By Normandeau Associates, Inc.; Bedford, New Hampshire
- PSC 30 "VERTICAL DISTRIBUTION AND ABUNDANCE OF FINFISH IN THE AREA OF THE PROPOSED SEABROOK STATION INTAKE"; By Normandeau Associates, Inc.; Bedford, New Hampshire; February 1975

- PSC 32 "SEABROOK ECOLOGICAL STUDY 1975. FINFISH ECOLOGY INVESTIGATIONS AT THE HAMPTON-SEABROOK ESTUARY, NEW HAMPSHIRE AND ADJOINING COASTAL WATERS, 1974-1975"; By Normandeau Associates, Inc.; Bedford, New Hampshire; Feb. 1976
- PSC 34 "PROBABILITY OF COASTAL WATERS ENTERING THE HAMPTON HARBOR ESTUARY AND NEIGHBORING ESTUARIES AS A FUNCTION OF DISTANCE AND DEPTH OFFSHORE"; By Normandeau Associates, Inc.; Bedford, New Hampshire
- EPA 37 "TESTIMONY OF ROBERT J. LEGER"
- EPA 40 "TESTIMONY OF FRANCIS X. O'BRIEN"
- EPA 62 "SEABROOK STATION — SECTION 316 DETERMINATIONS"; By Ropes & Gray; Boston, Massachusetts; May 1975
- EPA 74 "HYDROTHERMAL STUDIES OF DIFFUSER DISCHARGE IN THE COASTAL ENVIRONMENT: SEABROOK STATION"; By Alden Research Laboratories; August 1974
- EPA 76 "THE BENTHOS INHABITING THE AREA OF THE PROPOSED SEABROOK STATION DISCHARGE"; By Normandeau Associates, Inc.; Bedford, New Hampshire; October 1975

**APPENDIX****CURRICULUM VITAE****WILLIAM A. BRUNGS**

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*Honors:*

Arts College Student, Faculty and College Office Award for scholarly achievement, Ohio State University, 1958.  
 National Science Foundation Cooperative Fellowship, Ohio State University, 1961.  
 National Science Foundation Summer Teaching Fellowship, Ohio State University, 1961.  
 Scientific Research Society of America (Sigma Xi) membership, 1965.  
 Appointment as Adjunct Assistant Professor at the Ohio State University, 1970.  
 Honorable mention by American Fisheries Society for a paper published in Vol. 98, 1970.  
 Special commendation from Dr. Stanley Greenfield, Assistant Administrator for Research and Development (U. S. Environmental Protection Agency) for participation in the Energy Research and Development Planning Task Force, 1974.

*Positions Held:*

Technical Assistance Director, Environmental Research Laboratory, Duluth, Minnesota, June 1976-present.  
 Assistant Director for Water Quality Criteria, Environmental Research Laboratory, Duluth, Minnesota, 1971 — June 1976.  
 Research Director, Newtown Fish Toxicology Station, FWPCA, Cincinnati, 1967-1970.  
 Aquatic Biologist, Newtown Fish Toxicology Station, 1964-1967.  
 Aquatic Biologist, Robert A. Taft Sanitary Engineering Center, USPHS, Cincinnati, Ohio, 1961-1964.



### Membership in Professional Societies

American Association for the Advancement of Science  
 American Fisheries Society (also Certified Fisheries Scientist)  
 American Society of Zoologists  
 International Association for Great Lakes Research  
 Signam Xi  
 The American Institute of Fishery Research Biologists  
 Water Pollution Control Federation

### Publications:

- 1960 • An Albino Five-lined Skink, *Eumeces fasciatus* Linnaeus. Copeia 4: 369-370.
- 1965 Experimental Uptake of Strontium-85 by Freshwater Organisms. Health Phys. 11: 41-46.
- 1967 • Biomonitoring of Industrial Effluents. Proc. 21st Ind. Waste Conf., Purdue Univ., Part I, 50(2), 1966. pp. 117-124.
- 1967 • Influence on Suspended Solids on the Acute Toxicity of Endrin to Fathead Minnows. Proc. 21st Ind. Waste Conf., Purdue Univ., Part I, 50(2), 1966, pp. 4-12.
- 1967 Distribution of Cobalt 60, Zinc 65, Strontium 85, and Cesium 137 in a Freshwater Pond. U. S. Department of Health, Education and Welfare, Pub. Health Serv. Publ. No. 999-RH-24. 52 p.
- 1967 • Lethal Endrin Concentration in the Blood of Gizzard Shad. J. Fish. Res. Board Can. 24(2): 429-432.
- 1967 • A Simplified Dosing Apparatus for Fish Toxicology Studies. Water Res. 1: 21-29.
- 1967 • A Device for Continuous Treatment of Fish and Holding Chambers. Trans. Am. Fish. Soc. 96(1): 55-57.
- 1969 Chronic Toxicity of Zinc to the Fathead Minnow, *Pimephales promelas* Rafinesque. Trans. Am. Fish. Soc. 98(2): 272-279.
- 1970 • A Water Delivery System for Small Fish-Holding Tanks. Trans. Am. Fish. Soc. 99(4): 799-802.
- 1970 Effects of Heated Water From Nuclear Plants on Aquatic Life. pp. 52-59. In: Nuclear Power and the Public. Univ. Minn. Press, Minneapolis. 273 p.
- 1971 Chronic Effects of Low Dissolved Oxygen Concentrations on the Fathead Minnow (*Pimephales promelas*) Rafinesque. Res. Board Can. 28(8): 1119-1123.
- 1971 Chronic Effects of Constant Temperature on the Fathead Minnow (*Pimephales promelas*) Rafinesque. Trans. Am. Fish. Soc. 100: 659-664.
- 1971 Book Review: Electric Power and Thermal Discharges. (Merrill Eisenbud and George Gleason, Editors.) Gordon and Breach, New York, 1970. 424 p. Science 172: 465.
- 1972 Effects of Pesticides and Industrial Wastes on Surface Water Use. pp. 353-365. In: River Ecology and Man. Academic Press, New York and London. 465 p.
- 1972 • Changes in the Blood of the Brown Bullhead (*Ictalurus nebulosus* LeSueur). Following Short and Long Term Exposure to Copper (II). Toxicol. Appl. Pharmacol. 23: 417-427.
- 1973 A Procedure for Separating Eggs of the Fathead Minnow. Prog. Fish-Cult. 35(1): 54.
- 1973 Continuous Flow Bioassays With Aquatic Organisms: Procedures and Applications. pp. 117-126. In: Biological Methods for the Assessment of Water Quality. American Society for Testing and Materials, STP 528.
- 1973 • Acute and Long-Term Accumulation of Copper by the Brown Bullhead (*Ictalurus nebulosus* (LeSueur)). J. Fish. Res. Board Can. 30(4): 583-586.
- 1973 Effects of Residual Chlorine on Aquatic Life. A Literature Review. J. Water Poll. Control Fed. 45: 2180-2193.
- 1975 • Effects of Pollution on Freshwater Fish. A review of the literature for 1974. J. Water Poll. Control Fed. 47: 1711-1820.
- 1976 • Acute and Chronic Toxicity of Copper to the Fathead Minnow in a Surface Water of Variable Quality. Water Res. 10: 37-43.
- 1976 • Accumulation of Elements in Fish Exposed to Suspensions of Neutron Activated Taconite Tailings. Manuscript.
- 1976 Evaluation of chronic and Sublethal Toxic Effects in the Assessment of Aquatic Environmental Impact. Presented at the AIBS/Ecological Society of America Symposium, June 2-3, 1976. Proceedings to be published.

- 1976 • Temperature Criteria for Freshwater Fish: Protocol and Procedures. U.S. Environmental Protection Agency, Duluth, Minn. Ecological Research Series (in press).
- 1976 Effects of Wastewater and Cooling Water Chlorination on Aquatic Life. U.S. Environmental Protection Agency, Duluth, Minn. 46 p.
- 1976 • Effect of Exposure Time and Copper Concentration on Reproduction of the Fathead Minnow (*Pimephales promelas*). (In press.)
- 1977 General Considerations Concerning the Toxicity to Aquatic Life in Chlorinated Condenser Effluent. In: Technology and Ecological Effects of Biofouling Control Procedures at Thermal Power Plant Cooling Water Systems (Loren D. Jensen, Editor). Proceedings of a Workshop held at the Johns Hopkins University. June 16-17, 1975. Ecological Analysts, Inc., Wantagh, N.Y.

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## CURRICULUM VITAE

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### Degrees and Advanced Study:

B. S. University of Washington, 1956  
M. S. Oregon State University, 1960

### Honors:

Public Health Service participant in Second International Oceanography Symposium, Moscow, USSR.  
USEPA Participant in International Symposium on Ocean Outfalls, London, England.  
Guest Lecturer, Polish Academy of Sciences, Sopot, Poland.

### Positions Held:

Research Oceanographer, Environmental Research Laboratory, Corvallis, 1975-present.  
Chief, Physical Oceanography Section, Coastal Pollution Branch, Environmental Research Laboratory, Corvallis, 1966-1975.  
Physical Oceanographer, USPHS, Portland, Oregon, 1960-1966.  
Physical Oceanographer, USBCF, Seattle, Washington, 1958-1959.  
Physical Oceanographer, USBCF, Honolulu, Hawaii, 1956-1958.

### Membership in Professional Societies:

Sigma Xi  
AAAS  
American Society of Limnology and Oceanography  
American Geophysical Union

### Publications:

- 1957 Oceanographic and Meteorological Observations in the Northeast and Central North Pacific, July-December 1956. USFWS SSR No. 239. 49 pp.
- 1958 Annual Variations of Sea Temperature in the Northeast Pacific Ocean, Proc. Hawaiian Acad. of Sciences.



- 1959 • Northeast Pacific Albacore Survey. Part 2: Oceanographic and Meteorological Observations. USFWS SSR No. 315. 133 pp.
- 1960 Prospectus for an Oceanographical Investigation of the Umpqua River Estuary and Related Studies of the Umpqua River Basin. U.S. Dept. H.E.W., PHS, WSPC, Portland, Oregon. 23 p. mimeo.
- 1961 • Physical Hydrographic Data Offshore from Newport, Oregon. Data Report No. 4, Ref. 61-1. January 1961. 15 pp. Oregon State University.
- 1961 • North Pacific and Bering Sea Oceanography, 1959. USFWS SSR No. 337. 212 pp.
- 1961 Physical and Chemical Oceanographic Data: Umpqua River Estuary, Oregon: Part I, December 14-15, 1960. U.S. Dept. H.E.W., PHS, WSPC, Portland, Oregon. 15 p. mimeo.
- 1961 Physical and Chemical Oceanographic Data: Umpqua River Estuary, Oregon: Part II, March 21-22, 1961. U.S. Dept. H.E.W., PHS, WSPC, Portland, Oregon, mimeo.
- 1961 Physical and Chemical Oceanographic Data: Umpqua River Estuary, Oregon: Part III, March 21-22, 1961. U.S. Dept. H.E.W., PHS, WSPC, Portland, Oregon, mimeo.
- 1961 Physical and Chemical Data: Umpqua River Estuary, Oregon: Part IV, April 26-27, 1961. U.S. Dept. H.E.W., PHS, WSPC, Portland, Oregon, mimeo.
- 1963 Ocean Conditions in the Vicinity of the Aleutian Islands, Summer 1957. Bulletin 11, North Pacific Fish Comm. 29 pp.
- 1963 Same title as above. Paper published in Japanese: 1957
- 1963 Note on the Distribution of Dissolved Oxygen and Sulfate Waste Liquor in the Vicinity of a Deep Submerged Outfall. Great Lakes Research Section of Amer. Soc. Limn. and Oceanog. Paper read at Ann Arbor, Michigan. 9 pp.
- 1966 • Lucky Peak Reservoir. 1965 Water Quality Data Report. U.S. H.E.W., FWPCA, Portland, Oregon. 38 pp. proc.
- 1966 Separation of Upwelled and Pollution Caused Low Dissolved Oxygen in an Estuary. Paper No. 76-Stb. p. 76, Proc. 2nd Intl. Ocean Congress. Moscow, USSR.
- 1967 • Technical Approaches Toward Evaluating Estuarine Pollution Problems. In *Estuaries*, edited by George H. Lauff. Publication No. 83, American Association for the Advancement of Science, Washington, D. C., 1967. pp. 693-700. NTIS PB 217-267.

- 1969 • Mathematical Model of the Columbia River from the Pacific Ocean to Bonneville Dam — Part I: Theory, Program Notes and Programs. Pac. N.W. Water Lab.
- 1970 Summary of the Oceanography and Surface Wind Structure of the Pacific Subarctic Region in Relation to Waste Releases at Sea. Working Paper No. 76. Pacific Northwest Water Laboratory, Corvallis, Oregon. 66 pp. NTIS PB 204-73.
- 1970 • Temperature Model of the Columbia River Estuary and River. Paper presented at the joint meeting of the Pacific Division of the American Society of Limnology and Oceanography and the American Association for the Advancement of Science, held in Berkeley, California, June 22-26, 1970. Unpublished. (Abstract available through EPA-Corvallis library).
- 1970 Statement before the conference on pollution of Lake Michigan and its tributary basin, 3rd session, reconvened in workshop sessions, October 1-2, Chicago, Vol. 3, pp. 1379-1384.
- 1970 • Salinity, Runoff and Wind Measurements Yaquina Estuary Oregon. April 1967 - October 1968, Working Paper No. 70. Pacific Northwest Water Laboratory, Corvallis, Oregon. 42 pp. NTIS PB 210-73.
- 1971 Discussion. In *Estuarine Modeling: An Assessment*. Edited by George H. Ward and William H. Epsey, Jr., Washington, D. C. Government Printing Office. Water Pollution Control Research Series, 16070 DZV 02/71. p. viii. NTIS PB 206-807.
- 1971 • Mathematical Model of the Columbia River from the Pacific Ocean to Bonneville Dam — Part II: Input-output and Initial Verification Procedures. Pacific Northwest Water Laboratory, Corvallis, OR. 130 pp. NTIS PB 202-423.
- 1973 Numerical Model of Coastal Pollution with Three Open Boundaries. Paper given at a workshop held Aug. 3, 1973, at Oregon State University, Corvallis. Sponsored by the International Decade of Ocean Exploration, National Science Foundation. Abstract In Final Report of the Coastal Upwelling Ecosystems Analysis Summer 1973 Theoretical Workshop, prepared by Christopher N. K. Mooers and John S. Allen. Corvallis, School of Oceanography, November 1973, p. C-5. Also presented at the Thirty-sixth Annual Meeting of the American Society of Limnology and Oceanography, Inc. Held

- 1973 • Puget Sound Oceanographic Field Studies, Everett: Everett, Bellingham and Port Angeles. EPA-660-3-73-014, Corvallis, OR.
- 1974 • Computation of Tides, Currents and Dispersal of Pollutants in the New York Bight from Block Island to Atlantic City with Large Grid Size, Single and Two-layer Hydrodynamical-Numerical Models. Part 4. Published by the Envir. Pred. Res. Fac., Naval Postgraduate School, Monterey, California. January 1974. ENVPREDRSCHFAC Technical Note No. 4-74. 79 pp.
- 1974 Subsurface Horizontal Dispersion of Pollutants in Open Coastal Waters. Paper presented at the International Symposium on Discharge of Sewage from Sea Outfalls, in London, England, Sept. 1974. Proceedings. Paper No. 30. pp 297-307. Pergamon Press.
- 1974 Mathematical Modeling as a Framework for Coastal Monitoring. Paper presented at the EPA Seminar on methodology for monitoring the marine environment, held in Seattle, Washington, October 16-18, 1973. EPA-600/4-74-104, Oct. 1974. Washington, D. C.
- 1975 Statement before adjudicatory hearing on city of Philadelphia ocean dumping permit. EPA Hdqtrs. Washington, D. C.
- 1975 • Dispersion of Sewage Sludge Discharged from Sludge Vessels into New York Bight — Data Report I, Volume I — Total Suspended Material. To be published in CERL Ecol. Res. Series.
- 1975 • Dispersion of Sewage Sludge Discharged from Sludge Disposal Vessels into New York Bight — Data Report I, Volume III — Laboratory Studies of the Physical and Settling Characteristics of Sewage Sludge. To be published in CERL Ecol. Res. Series.
- 1975 • Dispersion of Sewage Sludge Discharged from Sludge Disposal Vessels into New York Bight — Data Report I, Volume II — Physical Oceanographic Data. To be published in CERL Ecol. Res. Series.
- 1976 • Dispersion of Sewage Sludge Discharged from Sludge Disposal Vessels into New York Bight. Data Report II. To be published in CERL Ecol. Res. Series.
- 1976 • Transport of Pollutants in the Vicinity of Prudhoe Bay, Alaska. Annual report to BLM/NOAA, OCSEAP, Boulder, Colorado. In Press.

- 1976 • Preliminary Analysis of the Dispersion of Sewage Sludge Discharged from Vessels to New York Bight waters. Limnology and Oceanography. In Press.
- 1976 • A brief Assessment of Estuary Modeling — Recent Developments and Future Trends. Congress. Hearings, to be published at EPA Hdqtrs. In Press.

•Co-authored or published with other individuals.



## CURRICULUM VITAE

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## Degrees and Advanced Study:

B. A. Adelphi University, 1958  
M. S. Adelphi University, 1962  
Ph.D. University of Maryland, 1969

## Honors:

Graduate Teaching Assistantship, Adelphi University, 1961-1962.  
Special Predoctoral Fellowship from USPHS for purpose of obtaining Ph.D., 1-F3, WP, 14601, 1964-1966.  
Past President, 1971, The Atlantic Estuarine Research Society.  
Member, American Institute of Fishery Research Biologists, 1972-present.  
Vice President, Estuarine Research Federation, 1973-1975.

## Positions Held:

Associate Deputy Assistant Administrator, Health and Ecological Effects Division, Office of Research and Development, April 1976 to present.  
Director, Ecological Processes and Effects Division, Office of Environmental Sciences, Office of Research and Development, April 1974-April 1976.  
Senior Staff Biologist, Office of Technical Analysis, Office of Enforcement and General Counsel, August 1972-April 1974.  
Project Coordinator, National Science Foundation-U.S. Army Corps of Engineers Project — "Existing Conditions Report on the Chesapeake Bay: (biota), September 1971-August 1972.  
Research Associate, Natural Resources Institute, University of Maryland, Department of Environmental Research, August 1966-September 1971.  
Marine Biologist, Florida State Board of Conservation, Marine Laboratory, St. Petersburg, Florida, 1959-1961.  
High School Teacher, Manatee County Board of Public Instruction, Bradenton, Florida, 1958-1959.  
Biological Aide, New York State Board of Conservation, Freeport, Long Island, New York — Summers, 1957/1959.

## Membership in Professional Societies:

American Society of Ichthyologists and Herpetologists  
American Fisheries Society  
Marine Biological Association of the United Kingdom  
Atlantic Estuarine Research Society  
The Estuarine Research Federation

## Publications:

- 1961 • A technique for the direct photography of translucent objects. *Trans. Amer. Fish. Soc.*, 90(4): 497-500.
- 1961 • Tagging of the great barracuda, *Sphyraena barracuda* (Waldbaum) *Trans. Amer. Fish. Soc.*, 90(4): 497-500.
- 1961 • Spawning seasons and growth of the code goby, *Gobiosoma robustum* in the Tampa Bay area. *Tulane Stud. Zool.* 9(2): 87-98.
- 1961 Striped Bass in Florida. Fla. St. Bd. Conserv. Mar. Lab., St. Petersburg, Florida. FSBCLM Cont. #61-19.
- 1962 • Seasonality of fishes on the South Florida shore. *Bull. Mar. Sci. Gulf and Carrib.* 12(1): 39-60.
- 1962 • A study of the behavior of some tagged, South Florida reef fishes. *Amer. Mid. Nat.* 67(2): 386-397.
- 1963 Checklist of Organisms Available for Laboratory Study from the Patuxent River. Nat. Res. Inst. Ref. #64-7.
- 1963 Aquarium behavior of juvenile labrid fishes. *Copeia* 1:186.
- 1963 A study of the age and growth of the gag, *Mycteroperca microlepis*. Good and Bean (Pisces:Serranidae) on the West Coast of Florida. *Fla. St. Bd. Cons. Tech. Series.* No. 41, 20 pp.
- 1964 • Age of sexual succession in the protogynous hermaphrodite, *Mycteroperca microlepis*. *Trans. Amer. Fish. Soc.* 98(3): 301-302.
- 1964 • Progress Report to Department of Water Resources. Nat. Res. Inst. Ref. #64-68.
- 1964 • Fish Collected by Haul Seine in the Patuxent River during the period August, 1962 to August, 1964. Nat. Res. Inst. Ref. #63-32.
- 1964 • Otter Trawl Collections made in the Patuxent River during the period June, 1962 to August, 1964. Nat. Res. Inst. Ref. #64-59.

- 1964 • Hydraulic Dredge Collections made in the Patuxent River during the period June, 1962 to May, 1964. Nat. Res. Inst. Ref. #64-50.
- 1965 Characteristics of the Baltic Macoma, *Macoma balirea* population in the middle Patuxent Estuary. *Chesapeake Sci.* 5(4): 200-208.
- 1967 Ethyl p-amionobenzoate: an anesthetic for cold-blooded vertebrates. *Copeia* 1:230-240.
- 1967 • Cooperative Zooplankton studies in the Patuxent River Estuary for the period July, 1963 to February, 1965. Nat. Res. Inst. Ref. #67-59.
- 1967 • Progress Report period January 1, to July, 1967. Patuxent Thermal Studies. Nat. Res. Inst. Ref. #67-61.
- 1967 • Progress report for the period July, 1966 to December, 1966. Nat. Res. Inst. Ref. #67-13.
- 1968 • Zooplankton and environmental characteristics of the Patuxent River Estuary 1963-1965. *Chesapeake Sci.* 9(2): 67-82.
- 1968 • Comparison of some anesthetic effects of MS-222 and benzocaine. *Trans. Amer. Fish. Soc.* 97(4): 496-498.
- 1968 • Life history aspects of the Hogchoker, *Trinectes maculatus* in the Patuxent River Estuary, Maryland. Workshop on the eggs, larvae and juvenile stages of fish in Atlantic Coast estuaries. Charleston, S.C. June 10-12, 1968. Nat. Res. Inst. Ref. #68-33.
- 1968 Statement presented to the National Estuarine Pollution Study meeting held at Orlando, Florida, March 12, 1968. Nat. Res. Inst. Ref. #68-12.
- 1968 • Graphical and Mathematical analysis of species diversity and abundance in fish populations. Nat. Res. Inst. Ref. #68-7.
- 1969 • Life history aspects of the hogchoker, *Trinectes maculatus* in the Patuxent River Estuary, Maryland. *Chesapeake Sci.* 10(2): 104-119.
- 1969 • Species diversity-species abundance of fish populations; and examination of various methods. *Proc. 22nd Annual Conf.*
- 1969 • Determination of upper temperature tolerance triangles for aquatic organisms. *Chesapeake Sci.* 10(3-4): 293-296.

- 1969 • Laboratory studies on temperature effects on estuarine animals. In: Patuxent Thermal Studies. Nat. Res. Inst. Ref. #69-13.
- 1969 • Fishery collections in the Patuxent Estuary 1962-1967. In: Patuxent Thermal Studies, Supplementary Repts. Nat. Res. Inst. Ref. #69-11.
- 1969 • Ctenophore and Jellyfish populations in the Patuxent Estuary. In: Patuxent Thermal Studies. Nat. Res. Inst. Ref. #60- .
- 1969 • Phytoplankton Studies. In: Patuxent Thermal Studies; Supplementary Repts. Nat. Res. Inst. Ref. #69-6.
- 1969 • Tables listing fishes collected from the Patuxent Estuary by three collecting methods for the period 1962-1967. Nat. Res. Inst. Ref. #69-38.
- 1969 • Testimony to Senate sub-committee on intergovernmental relations. 4-30-70.
- 1969 • Effects of thermal pollution on productivity and stability of estuarine communities. Fifth Ann. Rept., U. of Md., W.R.R.C.
- 1970 • Regional Planning and the Chesapeake Bay environment — an ecological approach. Proc. New England Coastal Zone Mgmt. Conf., U. of N.H., April 1970. p. 47-74.
- 1970 Book reviews: Pertinent concepts in computer graphics: Proceedings of the second University of Illinois conference on computer graphics. Edited by M. Faiman and J. Nievergelt. In: *Chesapeake Sci.* 11(2): 141.
- 1970 • Photographic method for surveying clam populations. 1970 *Proc. Mat. Shellfisheries Assoc.* 61: 91-94.
- 1970 • Thermal pollution, aquaculture and pathobiology in aquatic systems. *Jour. Wild-Diseases.* 6: 347-355.
- 1971 • Postoperative assessment of the effects of estuarine power plants. N.R.I. Ref. #71-24a.
- 1971 • Temperature tolerance and thyroid activity of the white perch, *Roccus (morone) americanus*. *J. Fish Biology.* 3: 97-114.
- 1972 • *Biota of the Chesapeake Bay.* 13 (Supplement): S1-S197. Includes four publications within the supplement: pp. S4-S-7, S-8-16, S42-S54, S55-S-64).



- 1972 • A cross-referenced index to current (1971-1972) biological and biology-related research on Chesapeake Bay. Univ. of Md. Nat. Res. Inst. N.R.I. Ref. #72-28: 60 pp.
- 1972 • Addendum to: A cross-referenced index to current (1971-1972) biological and biology-related research on Chesapeake Bay. Univ. of Md. Nat. Res. Inst. N.R.I. Ref. #72-28a: 161 pp.
- 1973 • A sport fishing survey in the vicinity of a steam-electric station on the Patuxent Estuary, Maryland. *Chesapeake Sci.* 14(3): 160-170.
- 1973 • The ecological effects of taconite tailing disposal on the benthic populations of western Lake Superior. In: *Studies Regarding the Effect of the Reserve Mining Company Discharge in Lake Superior; Supplement*, May 18, 1973: 1161-1319. (Mimeo).
- 1973 • Abundance, diversity and seasonal patterns of estuarine fish populations. *Estuarine and Coastal Marine Science* 1: 19-36.
- 1974 • The effects of power plants on productivity of the nekton. *Recent Advances in Estuarine Research* (in press).
- 1974 • Comparison of species diversity and faunal homogeneity indices as criteria of change in biological communities. *Proc. of the Seminar on Monitoring in the Marine Environ.* (in press).
- 1974 • Acute thermal tolerance of the American oyster, *Crassostrea virginica*, larvae. *Chesapeake Sci.* (in press).
- Co-authored or published with other individuals.

## CURRICULUM VITAE

## MOSTAFA AYAT SHIRAZI

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Environmental Research Laboratory  
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*Degrees and Advanced Study:*

B. S. California State University, 1959  
M. S. University of Washington, 1961  
Ph.D. University of Illinois, 1967

*Honors:*

Listed in Who's Who in the West and American Men of Science  
Courtesy Associate Professor, Oregon State University  
Member of faculty, Advisor, Committee on Ph.D. Candidates  
The "Spirit of Sprint" Award, Hercules  
EPA's Bronze Medal Award, 1975

*Positions Held:*

Research Mechanical Engineer, Environmental Research Laboratory, Corvallis, Oregon, January 1969 — present.  
Senior Research Engineer, Allegany Ballistics Laboratory, Hercules, Inc., December 1966 — December 1968.  
Teaching Assistant, Department of Mechanical Engineering, University of Illinois, September 1964 — September 1966.  
Research Assistant, Digital Computer Laboratory, University of Illinois, September 1961 — September 1964.  
Associate Research Engineer, Boeing Airplane Company, January 1961 — September 1961.  
Research Assistant, Engineering Experimental Station, University of Washington, April 1960 — December 1960.  
Research Assistant, Department of Oceanography, University of Washington, December 1959 — March 1960.

*Publications:*

- 1967 On the Motion of Small Particles in a Turbulent Fluid Field, Ph.D. Thesis, University of Illinois, Urbana, Illinois.
- 1967 On the Motion of Small Particles in a Turbulent Fluid Field, Developments in Mechanics, Proceedings of the Tenth Midwestern Mechanics Conference, p. 1179, Vol. 4.

- 1967 An Experimental Study in Motion of Small Particles in a Turbulent Fluid Field Using Digital Techniques for Statistical Data Processing, Developments in Mechanics, Proceedings of the Tenth Midwestern Mechanics Conference, p. 1248, Vol. 4.
- 1967 Hydrodynamics of Sewage Filtration, Final Report by Hercules Incorporated for Federal Water Pollution Control Administration, Contract No. 14-12-39.
- 1967 Thrust Vector Control Systems for Advanced Surface-to-Air-Missile Systems, Final Report prepared for the Department of the Navy, NOSC-ORD-0331, Contract #N00017-67-0027.
- 1968 The Effects of Closure Ejection of Sprint Nozzle Structural Integrity, Third International Congress for Rocket Propulsion and Guidance, American Institute of Aeronautics and Astronautics, Vol. 1, p. 31.
- 1968 Performance of Oval and Pinched Nozzles, Final Report prepared for Applied Physics Laboratory, Johns Hopkins University, Contract 271803.
- 1970 Thermoelectric Generators Powered by Waste Heat from Power Plants, Advances in Energy Conversion Engineering, Proceedings of the Intersociety for Energy Conversion, Engineering Conference, Las Vegas, 1970. Water Pollution Control Research Series 16130 — 10/70.
- 1971 Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan, Report to Environmental Protection Agency Enforcement Conference.
- 1972 Dry Cooling Towers for Electric Power Generation in Semi-arid Regions, Accepted for Publication in the International Journal of Water Pollution Research, 6:1309-1319.
- 1971 Basic Data Report on the Turbulent Spread of Heat and Matter, USGS-EPA Cooperative Study. Open-file Report, Ft. Collins, Colorado.
- 1972 Workbook of Thermal Plume Prediction, Volume II — Surface Discharges, Environmental Protection Agency Technology Series, EPA-R2-72-005b.
- 1972 Houston Lighting and Power v. Ruckleshaus, Discussion and Conclusions on Thermal Physical Effects of Heated Water Discharge into Trinity Bay.

- 1972 Dye Dispersion Test on Galveston Bay Physical Model Showing Effects of Cedar Bayou Plant Discharge into Trinity Bay, Supplement Report to Statement, Item 13.
- 1973 Effects of Ambient Turbulence on Buoyant Jets Discharged into a Flowing Environment. PNERL Working Paper #2, Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon, 14 pp.
- 1973 A Critical Review of Laboratory and Some Field Experimental Data on Surface Jet Discharge of Heated Water, PNERL Working Paper #4. Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon, 46 pp.
- 1973 Some Results from Experimental Data in Surface Jet Discharge of Heated Water. Paper presented at First World Congress on Water Resources. Chicago, Illinois.
- 1973 An Evaluation of Ambient Turbulence Effects on a Buoyant Plume Model. Paper presented at 1973 Summer Computer Simulation Conference, Montreal, Canada.
- 1973 Reviewing Environmental Impact Statements — Power Plant Cooling Systems, Engineering Aspects, Environmental Protection Technology Series, EPA 660/2-73-016.
- 1974 Workbook of Thermal Plume Prediction, Volume I: Submerged Discharge, Water Pollution Control Series 16130 ZFC 04/71.
- 1974 Heated Water Jet in a Coflowing Turbulent Stream. American Society of Civil Engineers, Hydraulic Division Journal, HY7.
- 1974 Engineering and Economic Aspects of Wet and Dry Cooling Systems, Special Studies for Northern Great Plains Resources Program.
- 1974 Needs for Plume Analysis for Thermal and Toxic Point Source Discharges, Paper presented at U.S.-Japan Symposium in Tokyo Japan, April 1974 — to be published in the proceedings.
- 1976 What Can We Learn From Thermal Prediction, Printed in EPRI's Report of a Workshop on the Impact of Thermal Power Plant Cooling Systems on Aquatic Environments, EPRI SR-38, Special Report Vol. II, pp. 187-197.



- 1976 Buoyant Surface Jet, Printed in the Proceedings of the EPA Conference on Environmental Modeling and Simulation, Sponsored by the Office of Research and Development and the Office of Planning and Management, U.S. Environmental Protection Agency, pp. 784-789.
- 1976 Analysis of Buoyant Surface Jets, Published in the Journal of Heat Transfer, Transactions of the ASME, Vol. 98, Series C, No. 3, pp. 367-372, Paper No. 76-HT-FFF.
- 1976 Cooling Tower Plume Research U.S. Environmental Protection Agency, Presented at the International Centre for Heat and Mass Transfer, Dubrovnik, Yugoslavia.

## CURRICULUM VITAE

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### *Degrees and Advanced Study:*

B. A. Johns Hopkins University, 1964  
Ph.D. College of William and Mary, 1972

### *Honors:*

Courtesy Assistant Professor, Oregon State University

### *Positions Held:*

Supervisory Research Oceanographer, Marine and Freshwater Ecology Branch, Newport Field Station, July 1972 — present.  
Associate Marine Scientist, Virginia Institute Marine Science, and Assistant Professor, College of William and Mary and the University of Virginia, November 1971 — June 1972.  
National Science Foundation Trainee, College of William and Mary, February 1968 — September 1971.  
Teaching Assistant in Biological Oceanography, College of William and Mary, September 1968 — January 1969.  
Research Assistant, Department of Applied Biology, Virginia Institute of Marine Science, September 1966 — January 1968.  
Biological Oceanographer, Hydrobiology Branch, National Oceanographic Data Center (NODC), June 1964 — September 1966.  
Student Trainee in Oceanography, NODC, Summers 1962 and 1963.

### *Membership in Professional Societies:*

Animal Behavior Society  
American Institute of Biological Sciences  
American Association for the Advancement of Science

### *Publications:*

- 1966 • Preliminary Manual for Coding and Key punching Marine Bioacoustical Data. National Oceanographic Data Center, Washington, D.C. 15 pp.
- 1968 • An Animal-Sediment Study in the Lower York River, Virginia. Final Rept. Atomic Energy Comm. Contract No. AT-(40-1)-2789. 18 p.

- 1968 \* Length, Weight, and Girth Relations in the Toadfish, *Opsanus tau*. Chesapeake Sci. 9: 249-253.
- 1972 \* A Taxonomic Code For the Biota of the Chesapeake Bay. Virginia Inst. Mar. Sci., Gloucester Pt., Va., Spec. Sci. Rept. No. 62, 117 p.
- 1972 \* Discussion of the Status of Knowledge Concerning Sampling Variation, Physiologic Tolerances, and Possible Change Criteria for Bay Organisms. Chesapeake Sci. 13 (Suppl.): S42-S54.
- 1972 \* Biota of the Chesapeake Bay: Conclusions and Recommendations. Chesapeake Sci. 13 (Suppl.): S8-S16.
- 1972 Postlarval Growth and Reproductive Biology of the Xanthid Crab, *Neopanope texana sayi*. Ph.D. dissertation, College of William and Mary, Williamsburg, Virginia. 230 p. Diss. Abst. 33: 7150-7151B.
- 1972 Biological Criteria of Environmental Change in the Chesapeake Bay. Chesapeake Sci. 13 (Suppl.): S17-S41.
- 1972 A Preliminary Design of an Information Storage System for Biological Collection Data. Chesapeake Sci. 13 (Suppl.): S191-S197.
- 1974 \* Comparison of Species Diversity and Faunal Homogeneity Indices as Criteria of Change in Biological Conditions. In Verner, S.S. (ed.), Proceedings of Seminar on Methodology for Monitoring the Marine Environment. U.S. Environmental Protection Agency, Environmental Monitoring Series. EPA-600/4-74-004, pp. 317-334.
- 1976 \* Subtidal Survey of the Strait of Magellan in the Vicinity of the *Metula* oil spill. Antarctic Journal of the United States.
- 1976 \* Structural Analysis of Stressed Marine Communities. Proc. EPA Symp. Marine, Estuarine and Fresh Water Quality Research. EPA Ecological Res. Series 600/3-76-079. pp. 3-12.
- 1976 Agonistic and Sexual Behavior of the Xanthid Crab, *Neopanope sayi*. Chesapeake Sci. 17: 24-34.
- 1976 Sex Ratio as a Function of Size in the Xanthid Crab, *Neopanope sayi*. Amer. Naturalist. 110: 898-900.
- 1976 Research Needs Concerning Pollution of the Marine Benthos. Proc. Int'l. Symp. Marine Pollution Res. S. P. Meyers (ed.). Louisiana St. Univ., Baton Rouge, LA. pp. 60-68.

- 1976 Species Diversity: Fact or Fiction. U.S. Fish and Wildlife Serv., Tech. Pap. Series. In press.
- 1977 Application of Diversity Indices in Marine Pollution Investigations. Proc. Symp. Biol. Evaluation of Environmental Impact. Council on Environmental Quality, Washington, D.C. In press.
- 1977 Reproductive and Molt Cycles in the Xanthid Crab, *Neopanope sayi*. Crustaceana.
- 1977 Techniques for Sampling and Analyzing the Marine Macrobenthos. Environmental Protection Agency. Ecological Res. Ser. In press.
- \*Co-authored or published with other individuals.



## CURRICULUM VITAE

BRUCE ALAN TICHENOR

U.S. Environmental Protection Agency  
Environmental Research Laboratory  
Corvallis, Oregon 97330

*Degrees and Advanced Study:*

B. S. Oregon State University, 1962  
Ph.D. Oregon State University, 1966

*Honors:*

Received EPA's Bronze Medal Award, 1975.

*Positions Held:*

Chief, Criteria and Assessment Branch, Corvallis Environmental Research Laboratory, January 1976-present.  
Acting Chief, Thermal Pollution Branch, Corvallis Environmental Research Laboratory, July 1975-January 1976.  
Chief, Ecology Section, Thermal Pollution Branch, Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon, 1971-1975.  
Chief, Hydrographic Branch, National Thermal Pollution Research Program, Pacific Northwest Water Laboratory, FWPCA, Corvallis, 1968-1971.  
Acting Chief, Power Production, Pacific Northwest Water Laboratory, 1967-1968.  
Project Leader, Techniques of Planning Project, Pacific Northwest Water Laboratory, 1966-1967.

*Membership in Professional Societies:*

Phi Kappa Phi, Sigma Xi  
American Society of Civil Engineers  
Registered Professional Engineer in the State of Oregon

*Publications:*

1964 • Stream Temperature Prediction by Digital Computer Techniques, Department of Civil Engineering, Oregon State University, Corvallis, Oregon, 27 pages.

- 1964 Prediction of Average and Diurnal Temperatures in Wastewater Lagoon, Appendix B, pp. B-1 through B-28, in *Waste Water Lagoon Criteria for Maritime Climates*, Oregon State University, Engineering Experiment Station, Corvallis, Oregon.
- 1966 The Effect of Surface Configuration on Evaporation from a Porous Stream Model, Ph.D. Thesis, Oregon State University, 161 pages.
- 1968 FWPCA's Role in Thermal Pollution Control. Paper presented at Cooling Tower Institute Meeting, Los Angeles, California.
- 1968 • U.S. Department of Interior, FWPCA, Northwest Region, Pacific Northwest Water Laboratory, *Industrial Waste Guide on Thermal Pollution*, 112 pages.
- 1969 • Research Needs for Thermal Pollution Control. Paper presented at National Symposium on Thermal Pollution, Engineering Aspects, Nashville, Tennessee, August 16, 1968. Published in *Engineering Aspects of Thermal Pollution*, F. L. Parker and P. A. Krenkel, Editors, Vanderbilt University Press.
- 1969 • Economic Aspects of Thermal Pollution Control in the Electric Power Industry, FWPCA, Northwest Region, Pacific Northwest Water Laboratory, Corvallis, Oregon. Working Paper No. 67, 13 pp.
- 1970 The Effect of Water Temperature on Cooling Pond Operation. Paper presented at the 43rd Annual Meeting of the Northwest Scientific Association, Salem, Oregon, March 28, 1970.
- 1970 • A Model of Natural Draft Cooling Tower Performance. *Journal of the Sanitary Engineering Division*, American Society of Civil Engineers, pp. 927-943.
- 1970 • A Method for Predicting the Performance of Natural Draft Cooling Towers, U.S. Department of Interior, FWPCA, Northwest Region, Pacific Northwest Water Laboratory, National Thermal Pollution Research Program, Corvallis, Oregon, 76 pp.
- 1970 U.S. Department of Interior, FWPCA, "Feasibility of Alternative Means of Cooling for Thermal Power Plants Near Lake Michigan," National Thermal Pollution Research Program, Pacific Northwest Water Laboratory and Great Lakes Regional Office, 114 pp.
- 1971 Statement Before the Conference on Pollution of Lake Michigan and its Tributary Basin, 3rd Session, Chicago, Illinois, September 28-30, October 1-3, 1970, pp. 163-311, and March 24-25, 1971, pp. 157-173.

- 1971 • Cooling Pond Temperature Versus Size and Water Loss, *Journal of the Power Division*, American Society of Civil Engineering, pp. 589-596.
- 1972 Presentation to National Association of Corrosion Engineers, March 21, 1972, St. Louis, Missouri (unpublished).
- 1973 Evaluation of Thermal Pollution Control Alternatives, Chapter 7 in *Environmental Impact on Rivers*, W. H. Shen, Editor, Ft. Collins, Colorado, pp. 7-1 through 7-22.
- 1973 EPA's View of Waste Heat Control, National Meeting, American Institute of Chemical Engineers, March 1973, New Orleans, Louisiana, published in *Water — 1973*, AIChE.
- 1973 • Reviewing Environmental Impact Statements — Power Plant Cooling Systems, Engineering Aspects, EPA Research Report Number EPA-660/2-73-016, 93 pp.
- 1974 • Engineering and Economic Aspects of Wet and Dry Cooling Systems, in *Special Studies of Northern Great Plains Resource Program*, EPA, Thermal Pollution Branch, Corvallis, Oregon, pp. II-1 through II-19.
- 1974 • Feasibility of Alternative Cooling Systems for Power Plants in the Northern Great Plains, EPA, Region VIII, Denver, Colorado, 37 pp.
- 1975 • Energy Penalties — Wet Closed-Cycle Cooling Systems for Electric Power Plants, presented at the Annual Meeting of the American Institute of Chemical Engineers, Washington, D.C., December 1974, published March, 1975, AIChE.
- 1975 • Cooling Tower Plume Measurements, presented at the International Conference on Environmental Sensing and Assessment, Las Vegas, Nevada, 18 September 1975.
- 1977 • EPA's Cooling Tower Plume Research, accepted for publication in American Society of Civil Engineers, *Journal of the Power Division*.
- \*Co-authored or published with other individuals.

**UNITED STATES OF AMERICA**  
**BEFORE THE**  
**ENVIRONMENTAL PROTECTION AGENCY**

IN THE MATTER OF  
PUBLIC SERVICE COMPANY OF  
NEW HAMPSHIRE, ET AL.

(SEABROOK STATION, UNITS 1 and 2)

National Pollutant Discharge  
Elimination System Permit  
Application No. NH 0020338

Case No. 76-7

**DENIAL OF MOTION FOR STAY AND  
PARTIAL GRANT OF MOTION TO ADD  
TO THE RECORD ON APPEAL**

On July 12, 1977 I received from the Seacoast Anti-Pollution League and the Audubon Society of New Hampshire (hereinafter collectively referred to as "SAPL") a motion for stay of my decision dated June 10, 1977 and issued June 17, 1977 in the above matter and a motion to add additional items to the record on appeal. The parties were given until July 22, 1977 to file briefs in opposition to or support of these motions. Public Service Company ("PSCo") filed a timely brief. The date for filing briefs was extended to August 5, 1977 for the Office of General Counsel of the Agency, which had not received notice of the motions or of the briefing schedule. On August 4, 1977 I was informed by the General Counsel of the Agency that that Office had decided not to file a brief with respect to the



motions. For the reasons discussed below I have determined that a stay of my decision should not be granted and that the motion to add additional items to the record on appeal should be granted in part.

## I. Motion for Stay

### A. Jurisdiction

The Agency's regulations do not provide for issuance of stays. However, section 10(d) of the Administrative Procedure Act ("APA") (5 U.S.C. § 705) provides that "When an agency finds that justice so requires, it may postpone the effective date of action by it, pending judicial review." Section 10(d) also provides that the reviewing court may postpone the effective date of agency action.

PSCo argues that, when the statute authorizing judicial review grants exclusive jurisdiction to the court, absent the express provision of parallel jurisdiction in the agency the agency is powerless to act while the case is in the court of appeals. In other words, under PSCo's interpretation the phrase "pending judicial review" must mean "until a petition for review is filed with the appellate court." There does not appear to be any compelling reason for adopting this rather narrow interpretation of section 10(b). Issuance of a stay by the Agency would not impede or be inconsistent with judicial review. The cases cited by PSCo, though they contain language which could be interpreted as supporting PSCo's theory, are not persuasive because they all deal with agencies taking steps which would or could result in modification or termination of the agency order, and do not discuss the meaning of section 10(b) as it applies to a simple stay. Accordingly, I believe that I have authority to issue a stay of my decision in this case if I find that "justice so requires".

## B. Standard for Issuance of a Stay

The tests for issuance by a court of a stay of an administrative order are set forth in the much-cited case of *Virginia Petroleum Jobbers Assn. v. FPC*, 259 F.2d 921, at 925 (D.C. Cir. 1958). The four tests are: 1) Has the petitioner made a strong showing that it is likely to prevail on the merits of its appeal? 2) Has the petitioner shown that without such relief it will be irreparably injured? 3) Would the issuance of a stay substantially harm other parties interested in the proceedings? and 4) Where does the public interest lie? These tests are also used by agencies in deciding whether to issue stays of their own orders. See cases collected in Pike and Fisher, *Administrative Law* 2d, § 10d-1.

SAPL argues that a stay is frequently issued in cases where the decision adopts a novel interpretation of law, which may succumb to judicial review. Even if this is correct, my decision did not adopt any novel interpretation of law, and therefore a stay is not warranted.

## C. Determination with Respect to Issuance of a Stay

### 1. Likelihood of Success

In support of its claim that it is likely to prevail on the merits in its appeal, SAPL asserts that there were three substantive errors and three procedural errors in my decision. The first substantive error alleged is that while finding that the record was adequate for a determination that PSCo was entitled to an exemption under section 316(a) of the Federal Water Pollution Control Act Amendments of 1972 ("FWPCA") and that the cooling water structures represent "best available technology" under section 316(b), I also found that PSCo's studies were inadequate as baseline studies and that this would hamper later efforts to

study the changes wrought by the plant. SAPL maintains that these conclusions "swear at each other". I see no inconsistency in these findings. To greatly oversimplify a complex matter, the essence of my decision was that the area that would be affected by significant rises in temperature and other effects of the cooling water system was so small, and the available sources of recruitment and replacement were so large, that the test of section 316(a) would be met. Precise quantification of the numbers of organisms that might be affected was simply unnecessary in this case. (It might be needed in another case where the impact of the cooling system on the receiving waters was more pronounced.) Similarly, precise quantification of affected organisms was not required in order for me to make a determination as to whether the technology embodied in the proposed cooling water intake structures represented "best available technology to minimize adverse environmental impact". However, in order to do a proper study of the actual effects of the plant after it starts operation, it is necessary to have precise baseline data as to the numbers, etc., of selected species in the area before start-up of the plant. The purpose of this data is to permit a "before and after" comparison which, to the extent feasible, will detect subtle changes, if any, caused by the plant.

SAPL's second substantive objection is that nothing in the record permits an informed judgment that either of the intake locations suggested by PSCo is the "best available". The unstated assumption of SAPL's argument seems to be that PSCo must submit data describing, and the Agency must consider, an infinite number of sites to determine which one is the "best". This would place a heavy burden on both the Agency and the applicant, and is an unreasonable reading of § 316(b). Section 316(b) requires only that the "location [of cooling water intake structures] . . . reflect

the best technology available for minimizing adverse environmental impact." What this means is that the Agency must consider factors such as a horizontal and vertical placement of the intake structure with respect to the local above-water and under-water topography, the location of the intake with respect to shoreline, navigation channels, wetlands, discharge structures, areas of important biological activity, and so forth. (See discussion in Development Document for Best Technology Available for the Location, Design, Construction and Capacity of Cooling Water Intake Structures for Minimizing Adverse Environmental Impact, pp. 15-26 (April 1976) and pp. 9-18 of the December 1973 version of that document.)

SAPL also contends that the data for the far site did not represent "worst case" conditions because the entrainment model integrated patches of larvae. For the reasons stated in the decision, over a large time and space scale such as the one involved in this case, the results of modelling with and without integration would tend to be the same. I therefore find that there is no basis for SAPL's assertion that the record does not permit an informed judgment with respect to the location of the intake structures.

SAPL's third substantive objection is to my "constant admission that data are lacking in certain areas, followed immediately by [my] 'assumption' that the data, if produced, would still justify [my] ultimate conclusion." What SAPL seems to object to is the application of ordinary judgment in drawing conclusions from the record. For instance, SAPL makes much of my statement that "there is no reason to believe, however, that such fish kills [resulting from exposure to high temperatures in the backflushing plume], if they occur, will be in numbers sufficiently large to cause any imbalance in the indigenous population." This statement is based principally on consideration of the evi-



dence in the record concerning the ability of nekton to sense temperature gradients and thus to avoid lethal temperatures (e.g., Affidavit of Bruce W. Smith in Response to Administrator's Request for Information, pp. 6-7). Due to this well-known phenomenon and the infrequent use of backflushing, it cannot be anticipated that fish would be killed, as a result of exposure to high temperatures in the backflushing plume, in numbers large enough to suggest a threat of imbalance of indigenous populations. Moreover, the fish population is replenished from the Gulf of Maine. Thus, although the possibility of fish being killed cannot be ruled out altogether, a judgment can be made that fish will not be killed in numbers sufficient to cause an imbalance in the indigenous population of shellfish, fish and wildlife. It is not necessary to attempt to predict exactly how many fish might be killed by backflushing.

SAPL's first procedural objection is to my use of a technical panel of Agency experts to assist me in review of the record. Use of the Agency's technical experts to assist me in coming to a decision was fully justified, for reasons cogently expressed by Professor Davis:

"The reasons for consultation with agency specialists involve one of the principal elements of strength of the administrative process. The typical commissioner or board member is not necessarily a specialist in all the fields of specialization that are drawn upon in deciding cases, although a good many are specialists in one or more such fields, and although long tenure with a particular agency may gradually build up special competence in many aspects of the agency's work. A commissioner may be a lawyer or an engineer or — what is more likely — he may be a politician, that is, one whose principal experience has been in seeking and holding elective office. The special strength of the administrative process does not grow out of diversity of backgrounds of agency heads, although some advantage may result from having one commissioner who is an engineer, another who is a

lawyer, and another who is a politician. The strength lies in staff work organized in such a way that the appropriate specialization is brought to bear upon each aspect of a single decision, the synthesis being provided by the men at the top.

"The central idea is very simple: We don't want the engineer-commissioner to decide a question of law without advice from the legal staff, and we don't want the lawyer-commissioner to decide a question of engineering without advice from the engineering staff." 2 Davis, *Administrative Law* 84 (1958).

SAPL complains that in my decision I "ignored and even failed to acknowledge" the existence of the reports of three outside consultants hired by the Agency to assist in review of the record, and that I relied totally on the technical panel. These three experts were hired by my Judicial Officer (whose job is to assist me in preparation of decision documents), to assist in her review of the record. They were hired on the recommendation of one of the Agency experts who was familiar with the case. These three experts (two of whom were biological oceanographers and one of whom was a statistician) informed the Judicial Officer that many of the reports submitted by PSCo's consultants were of poor quality and that in their opinion the evidence was inadequate to support the Determinations.

Meanwhile, Mr. Russell Train (who was Administrator of the Agency when the appeal from the Regional Administrator's decision was made) resigned in late January, and I was appointed Administrator, effective March 11, 1977. After being briefed about the case, I determined that further review of the record by a technical panel of six agency experts should be undertaken. This was done because it was felt that experts in further disciplines (particularly modelling, physical oceanography and fish biology) were needed to properly review the record and also that

the record should be reviewed by Agency personnel experienced with thermal discharges (but who had not participated in review of the Seabrook studies). The technical panel thoroughly reviewed the record and advised me unanimously that, although not of high quality, it was adequate except with respect to certain aspects of the effects of backflushing. I therefore requested and received from PSCo information with respect to backflushing. My technical panel reviewed this evidence and advised me that the record, as so supplemented, was adequate to make a determination.

While it is true that I saw no need to refer to the reports of the three outside experts in my decision, I did not ignore them. I asked the technical panel to consider and comment upon their reports. I found that the advice of my technical panel was more convincing than that of the three outside experts. As mentioned above, insignificant effects on marine life in and around Hampton Harbor can be expected from the cooling water system because the area in which adverse environmental effects will occur is so small and the sources of recruitment and replacement are so large. Thus additional studies designed to precisely quantify effects were simply unnecessary and would not have aided the decision-making process.

SAPL also complains that the technical panel came to their conclusions in "total secrecy" and that SAPL had no opportunity to cross-examine them. The technical panel, like myself and all other members of my staff, was instructed not to have or receive any *ex parte* contacts with persons interested in the case. Moreover, I did not use the technical panel to supplement the record. The technical panel was instructed to, and did, base its recommendations on the record. As they did not supplement the record there is no reason why they should have been cross-examined.

Finally, SAPL claims that it was deprived of its right to cross-examination, under section 7(d) of the APA, with respect to the use of post-record affidavits and a post-record study on the thermal effects of backflushing. I cannot agree with SAPL's position. Assuming that NPDES proceedings by the Agency are subject to the adjudicatory provisions of the APA, section 7(d) provides that in cases involving applications for initial licensing an agency may, when a party will not be prejudiced thereby, adopt procedures for the submission of all or part of the evidence in written form. The proceedings in the Seabrook case involved initial licensing.

In my request for additional information I stated that a hearing would be provided if certain conditions were met. These conditions were such as to assure that if cross-examination were necessary for a full and true disclosure of the evidence, it would be granted. SAPL failed to make a showing that the conditions were met and thus was not prejudiced by denial of a hearing with respect to the post-record affidavits and studies. The situation is precisely that in *American Public Gas Assn. v. FPC*, 498 F.2d 718 (D.C. Cir. 1974), which held that:

"The petitioners complain that they were denied the right to test through cross examination the underlying bases for the submitted data. Even in a formal adjudicatory hearing under the APA, however, cross examination is not always a right. Thus section 556(d), 5 U.S.C. 556(d) provides in part:

'A party is entitled to present his case or defense by oral or documentary evidence, to submit rebuttal evidence, and to conduct such cross-examination as may be required for a full and true disclosure of the facts. In rule making or determining claims for money or benefits or applications for initial licenses an agency may, when a party will not be prejudiced thereby, adopt procedures for the submission of all or part of the evidence in written form. . . .'



Here we think the petitioners have failed to demonstrate that cross examination was required for a full and true disclosure of the facts. All submittals and data upon which the Commission relied were tendered to the petitioners for comment, analysis, dissection and criticism, and for the submittal of rebutting material. Although the petitioners claim that cross examination of live witnesses was necessary they do no point to any specific weakness in the proof which might have been explored or developed more fully by that technique than by the procedures adopted by the Commission. We are told in general that the issues of costs, gas supply and rate of return might have been explored, but the petitioners do not suggest what questions were necessary for this purpose, nor do they explain why their written submittals were ineffectual. In the circumstances we cannot say that rights of the petitioners have been prejudiced." *Id.* at 723. (Emphasis deleted.)

In summary, SAPL has not made a strong showing that is likely to prevail on the merits of its appeal.

## 2. Irreparable Injury; Harm to Other Parties; Public Interest

SAPL claims that it will be substantially harmed by failure to grant a stay because construction damages the environment and constitutes "incremental decision making which tends to eliminate the meaningful right of Appeal the law intended [the parties other than PSCo] to have."

SAPL has not explained how it or the environment will be "irreparably injured" if the decision is not stayed, though it does claim that failure to grant a stay will cause "substantial harm". Site clearing has already been accomplished. SAPL claims that work on the proposed tunnel will as a practical matter determine the location of the intake and make appellate relief on the issue of whether or not the intake reflects the "best available technology" as to location difficult, if not impossible, to obtain. There is no indication of whether work on the tunnel is expected to

start before SAPL's appeal can be heard. Nor is there any explanation of why appellate relief might become impossible to obtain, due to start of the proposed tunnels. On the other hand, issuance of a stay would cause harm to PSCo's ratepayers because delay adds \$15 million per month to the cost of the plant, and this added expense will be passed on to ratepayers.

With respect to the public interest, SAPL claims that the most important public interest is in the maintenance of the integrity of the legal process, including the right to meaningful appeal. As indicated above I do not feel that SAPL is being deprived of a meaningful right of appeal. Moreover, determination of what is in the public interest requires consideration of many more issues than just the right of appeal.

Accordingly, SAPL's motion for stay of my decision dated June 10, 1977 is denied.

## II. Motion to Add Additional Items to Record on Appeal

SAPL moved that I include the following items as part of the record on review, as if they had been marked for identification at the adjudicatory hearing regarding this case.

1. Report of Dr. Theodore Smayda entitled "Evaluation of Scientific Investigation Carried Out in Connection with the Proposed Seabrook Station."
2. Report of Dr. Edward J. Carpenter entitled "Evaluation of Seabrook Nuclear Station Aquatic Environmental Studies."
3. A two-page handwritten letter from Dr. Janice Callahan to "Dear Harriet and Andy" and attached thirteen pages of comments on Normandeau reports.
4. Curriculum vitae of Theodore John Smayda entitled "G.S.O. Faculty Summary."

5. Three letters from Harriet B. Marple, Judicial Officer, to Drs. Smayda, Callahan, and Carpenter, dated January 17, 1977.
6. An updated note signed "Harriet" to "Dear Ed and Ted," and three-page attachment entitled "Questions for Biologists."

PSCo filed a brief in opposition to the motion, in which it stated that, although it believed it would not be proper to include the above items in the record in the manner suggested by SAPL, it would not object to their inclusion if the following other items were included:

7. A Technical Review of the 316a and 316b Determination in the Instance of the Seabrook New Hampshire Application by the USEPA Technical Work Group (March 11, 1977)
8. The Technical Work Group's Comments on:
  - a) Petitioner's Response to the Administrator's Request for Information of March 23, 1977 (4 pp.)
  - b) Evaluation of Seabrook Nuclear Station Aquatic Environmental Studies — E. J. Carpenter (4 pp.)
  - c) Dr. T. J. Smayda's Evaluation of Plankton Studies (2 pp.)
  - d) Dr. Callahan's Evaluation of Statistical Analysis (1 p.).

The Office of General Counsel of the Agency did not file a brief.

Although the law does not require it, I have made public items 1-3 because I felt it was in the public interest to do so in this case. Also, since my use of technical assistance may be in issue on appeal, I believe that the experts' reports should be made available for judicial scrutiny. Item 5 was furnished to SAPL pursuant to a Freedom of Information Act request and is arguably germane to the issue of my use of technical experts, as it shows that the record was

furnished to them for review. I have no objection to including item 4 in the record on appeal, as it shows the qualifications of one of the outside experts; I have also included in the record *curricula vitae* of the other two outside experts. However, I see no reason to include in the record item 6, which was not furnished to me in connection with my review of this case and can have no bearing on the propriety of my decision. In order to make the record complete, I am also including in the record on appeal items 7 and 8.

Accordingly, the motion of SAPL is granted as to items 1 through 5 above and denied as to item 6 above.

Dated: August 12, 1977

s/DOUGLAS M. COSTLE  
Administrator



**United States Court of Appeals  
for the First Circuit**

SEACOAST ANTI-POLLUTION  
LEAGUE, ET AL.,  
*Petitioners*

v.

DOUGLAS M. COSTLE,  
as Administrator of the  
Environmental Protection Agency,  
*Respondent*

PUBLIC SERVICE COMPANY  
OF NEW HAMPSHIRE,  
*Intervenor*

No. 77-1284

**MOTION OF THE INTERVENOR PUBLIC SERVICE  
COMPANY OF NEW HAMPSHIRE FOR LEAVE TO  
FILE A PETITION FOR REHEARING OUT OF TIME,  
AND PETITION FOR REHEARING; OR, IN THE  
ALTERNATIVE, MOTION TO RECALL THE MANDATE  
AND VACATE DECISION, ORDER AND JUDGMENT  
IN LIGHT OF SUBSEQUENT EVENTS**

Public Service Company of New Hampshire, an intervenor in the above-entitled cause, respectfully represents to the Court as follows:

1. In compliance with Rule 15 of the Local Rules of this Court, Public Service Company of New Hampshire hereby states that the argument herein was not presented before because it is based upon materials which became available

only after the Court's decision in this matter as appears more fully below.

2. On February 15, 1978, this Court issued a decision directing a remand to the Administrator of the Environmental Protection Agency (EPA) of his decision approving open-cycle cooling for the Seabrook nuclear power station.

3. This Court held that two procedural errors had occurred. The first of these was the failure of the Administrator to hold a hearing relative to his post-hearing Request for Information. Slip Op. at 14. This Court, however, ruled that, in light of 5 U.S.C. § 556(d), it would not order a full hearing, but rather a remand would be in order only to allow the Administrator to exercise his discretion as to whether cross-examination would be useful, a question which this Court believed the Administrator not to have focused upon as yet. *Id.* 14, 19. In addition, in connection with this order the Court stated:

"Ordinarily we might well overlook what appears to be a more theoretical than practical distinction, but we are influenced here by the fact that a remand is necessary anyway for the reasons discussed below." Slip Op. at 14-15.

4. Second, this Court found improper the perceived use by the Technical Panel of supplementary information from outside the record in four instances, identified in Slip Op. at 17-18. With respect to what this Court deemed the most "serious" of these instances, this Court stated:

"Whether or not these references do exist and whether or not they support the conclusions the panel goes on to draw does not concern us here. What is important is that the record did not support the conclusion until supplemented by the panel." Slip Op. at 17-18.

5. In the footnote to the second sentence of the above-quoted portion of the opinion this Court stated:

"We are not persuaded that the panel was referring to some other location in the record, for instance literature cited by a witness. Such a construction of the panel's statement would contradict its plain meaning by indicating that information not in the record might be in the record." Slip Op. at 17, n.21.

6. The EPA Administrator has ordered a hearing on remand and the Technical Panel has filed in connection therewith a response to this Court's decision. A copy of the Administrator's hearing order is attached hereto and marked "A".<sup>1</sup> A copy of the Technical Panel's response is attached hereto and marked "B".<sup>2</sup>

7. The Technical Panel's response makes clear (Response, p. 3) that its statements were not intended to "imply that [the] literature [referred to by the panel] is not cited and discussed in the record". Compare n.21 of the decision quoted *supra*. In its response, the Technical Panel also cites particular representative examples of literature which, along with its general expertise, the panel states to have constituted the basis of the recommendations in question. With one exception (a general textbook), these documents were all cited in the original hearing record and the Technical Panel lists on Page 19 of its response the citations to the original record as to each of these studies. And the single exception is cited in connection with a finding as

<sup>1</sup> The Hearing Order (p. 11) removes any ambiguity as to the question of whether the Administrator intended to deny cross-examination as to the materials received as the result of the post-hearing Request for Information.

<sup>2</sup> The Technical Panel's response was not known to or available to Public Service Company of New Hampshire prior to April 11, 1978, when it was received by mail.

to the impacts on wildlife, etc. (Response, pp. 12-13), a finding which this Court recognized might be based on logic rather than any perceived supplementation of the record. Slip Op. at 18.

8. Thus, it is now clear that, even if the Technical Panel could be found guilty of imprecision of language, it, in fact, held to the charge given it and did not add to the record. The major factual premise of this Court's decision is therefore in error.

9. This Court clearly has the power to enlarge the time for the seeking of rehearing, *Braniff Airways, Inc. v. Curtiss-Wright Corp.*, 424 F.2d 427, 429-30 (2d Cir. 1970); *FRAP* 40, to recall its mandate, or to issue an extraordinary writ vacating its decision at this juncture, *Powers v. Bethlehem Steel Corp.*, 483 F.2d 963 (1st Cir. 1973). 28 U.S.C. § 1651.

10. It may be suggested that a more appropriate course would be to let EPA have its hearing and then review the results thereof in due course if anyone should seek such relief or in the alternative to continue upon the course of petitioning the United States Supreme Court for a writ of certiorari.<sup>3</sup> Neither alternative is satisfactory. A hearing will involve large expense to all parties and adoption of that course of action means continuing uncertainty as to the permits held by the intervenor in light of this Court's

<sup>3</sup> As represented to this Court in its motion for stay of mandate, Public Service Company of New Hampshire, absent the grant of this motion, intends to seek a writ of certiorari. The petition is now in draft form; the Appendix is in printer's proof. The deadline for the filing of the petition is May 16, 1978. For this reason a ruling upon this motion is respectfully requested as soon as is consistent with the Court's many duties.



decision. The filing of a petition for certiorari would involve an effort to obtain review of this Court's decision based in part on materials never presented to this Court.

11. The Supreme Court has recently observed that administrative proceedings are not a "game" and that administrative decisions "should be set aside . . . only for substantial procedural or substantive reasons as mandated by statute . . . ." *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, \_\_\_ U.S. \_\_\_, \_\_\_, 46 U.S.L.W. 4301, 4309, 4311 (April 3, 1978). At this point no substantial procedural or substantive reasons exist which would continue to justify the remand to EPA. In light of this fact and of the views recently expressed in *Vermont Yankee* as to the discretion to be accorded an agency as to its choice of procedures, we respectfully submit that this is one of those rare cases where the inherent power of the Court to recall its mandate should be exercised. See *Powers v. Bethlehem Steel Corp.*, *supra* at 964.

WHEREFORE, Public Service Company of New Hampshire moves the Court to grant a rehearing of this matter or to recall its mandate and vacate the decision, order and judgment herein.

By its attorneys,

THOMAS G. DIGNAN, JR.  
R. K. GAD III  
Ropes & Gray

## ENVIRONMENTAL PROTECTION AGENCY

### SEABROOK NUCLEAR POWER PLANT LICENSING PROCEEDING

#### EPA Response to the Remand Order in the Seabrook Case

##### I. Introduction

In this Notice I am announcing the steps EPA will take to comply with the remand order issued by the United States Court of Appeals for the First Circuit in the case of *Seacoast Anti-Pollution League v. Costle*, No. 77-1284 (decided February 15, 1978).

This case arises out of the construction by Public Service Company of New Hampshire ("PSCO") of a nuclear electric generating station in the town of Seabrook, New Hampshire. The reactors must discard in some way a large amount of heat that is not converted into electricity. PSCO applied to EPA for permission to discharge the cooling water carrying this heat directly into the ocean offshore of the plant. Under the governing statutory provision, section 316(a) of the Federal Water Pollution Control Act, I am obligated to grant this permission if I decide that the proposed method of discharge will have an environmental impact small enough to "assure the protection and propagation of a balanced, indigenous pollution of shellfish, fish, and wildlife in and on [the body of water into which the discharge is to be made]."

On June 15, 1977, I announced my decision that PSCO had met this statutory burden and granted the permission requested. That decision was challenged in the courts by the Seacoast Anti-Pollution League and the Audubon

"A"

Society of New Hampshire (SAPL). On February 15, 1978, the court overturned my decision on two procedural grounds and remanded the case to me. First, it directed me to decide explicitly whether cross-examination was called for on certain submissions which I had invited and received from the parties to address a deficiency in the record.<sup>4</sup> Secondly, the court addressed questions raised about my use of a "technical panel" of agency experts in relevant fields to assist me in reaching a decision. It found that use of such experts to analyze the record was entirely proper, but also that the panel had overstepped that function and contributed new evidence of its own to the record.

The court therefore gave me the choice of trying to reach a new decision without relying on the technical panel's evidentiary contributions, or holding a supplementary hearing at which the panel members could be cross-examined on these contributions.

The court also said I could take "any other action within [my] power and consistent with this opinion."

I have decided to comply with these directives by holding a supplementary evidentiary hearing at which the members of the original technical panel will be made available for cross-examination. In addition, I have decided to reopen the record of this proceeding to allow any party to introduce any evidence which they elected not to introduce at the original hearing, or which has since become available, that may be useful to me in reaching a decision on the merits. Since a hearing must be held in any case, there is the potential for major gains, and small costs, in allowing this opportunity to supplement the record.

<sup>4</sup> The deficiency concerned a lack of data on the shape of the thermal plume generated when the flow of hot water through the cooling system is reversed to kill any organisms growing in the intake tunnel.

The parties to this supplementary proceeding will be restricted to persons who were parties in the original adjudicatory hearing.

The details of this supplementary proceeding are set out below.

## II. Procedures

### A. Initial Submission of Supplementary Information.

1. On or before April 7, 1978, the original members of the technical review panel shall submit a document stating the information they considered in making each of the generalized references to scientific knowledge discussed by the Court at pages 17 and 18 of its slip opinion. Copies of all material cited shall be attached to this response, and both the response and the accompanying copies shall be served on the Hearing Clerk and all parties.

The technical panel may also, in a separate section of their submission, bring forward any other information they believe would be useful to me in reaching a decision in this case. Once again, copies of all materials relied on shall be included.

2. On or before that same day, any other party may similarly file any such supplementary materials.<sup>5</sup> These shall be filed as indicated above, and full text copies of all material relied on shall be attached unless that material is formally published *and* generally available.

<sup>5</sup> The parties were informed in February by the Associate General Counsel for Water Quality, that most likely they would be asked to file supplemental written evidence. This notification was repeated at my request during an informal meeting of the parties on March 3 in Boston. That meeting included representatives of EPA's Offices of General Counsel, Regional Counsel and Enforcement.



**B. Submissions in Response.**

On or before May 30, 1978, any party, or the members of the original technical panel, may file and serve statements in the form set forth above responding to any points made or information furnished in submissions under paragraph A.

Any submissions under paragraphs A and B should be in narrative rather than question and answer form.

**C. Prehearing Conference.**

Before June 2, 1978, the Presiding Officer shall hold at least one prehearing conference to structure the supplementary adjudicatory hearing. The Presiding Officer is directed to consider the need to avoid unproductive cross-examination so that a timely decision on remand can be rendered. Particular attention should be given to the court's statements regarding cross-examination at page 14 of its slip opinion.

**D. Hearing.**

1. On or before June 5, 1978, the supplementary adjudicatory hearing shall begin. Presentation of testimony by panels of witnesses shall be permitted.

2. The Chief Administrative Law Judge or some other Administrative Law Judge designated by the Chief Administrative Law Judge shall serve as Presiding Officer at this hearing, and shall have full power to manage the course of the hearing. He shall have exclusive authority to rule on evidentiary issues.

I am requesting the Chief Administrative Law Judge immediately to name the Presiding Officer. The Presiding Officer may extend any limit or deadline specified in this

Notice but the total extensions granted shall not exceed ten days unless I grant a further extension at the written request of the Presiding Officer.

3. I am directing my staff not to appear at this hearing as proponents of any particular result, and avoid to the extent possible taking an adversary position in it. The staff of Region I shall prepare a technical summary and analysis of the evidence submitted on April 7 and shall file it on or before May 30, 1978. This report shall be non-adversary in nature, but shall contain specific conclusions and recommendations. The authors of this analysis shall be made available for cross-examination, to the extent such cross-examination is consistent with the statements of the court of appeals regarding cross-examination.

4. No member of the original technical review panel, or any other person who has been involved in the decision or litigation of prior stages of this proceeding, will assist me in the preparation of my Decision on Remand. I do not mean by this to imply any criticism of their prior involvement. However, in the light of the court's opinion, I believe I should take a complete new look at the case to the extent possible. To help reach that result, I am forming a technical staff group to assist me and the Presiding Officer in reviewing the record. That group consists of:

1. Dr. Bostwick H. Ketchum, Senior Scientist Emeritus Woods Hole Oceanographic Institution.
2. Dr. Roger Cortesi, Director of Criteria Development Division, Office of Research and Development.
3. Dr. Thomas Duke, Director of EPA's Gulf Breeze Environmental Research Laboratory.

These persons will be present at the adjudicatory hearing. I am directing the Presiding Officer to allow them to

ask questions of witnesses and to suggest or pursue lines of inquiry to the extent consistent with his overall authority to manage the proceedings. This will ensure that the hearing will be as useful as possible to those upon whom I will rely in reaching and preparing my decision. In addition David Bickart, Deputy General Counsel, will also be available to help in the preparation of my decision.

I believe this format complies with the current Rules of Practice for adjudicatory hearings. To the extent it does not, the procedures set forth in this notice are promulgated as temporary Rules of Practice to govern this proceeding.

5. The original record in this case as certified to the Court of Appeals will automatically become the initial part of the record in these proceedings. In effect, the hearing I am ordering will be a hearing supplemental to those original proceedings. Thus, the parties need not re-introduce evidence which is part of the original record.

### III. Legal Considerations.

In deciding on the course of action set forth above, I have reached a position on certain legal issues raised by the Court's decision. Those positions, and the reasons behind them, are set forth below:

#### A. Written Evidence.

The Court of Appeals disapproved the manner in which I requested written information from PSCO after the initial hearing had been held and when the case was on appeal to me.

Under the Administrative Procedure Act, the submission of evidence in written form may be required in cases, such as this one, concerning the initial grant of a license or

permit. The court acknowledged that but held that this result had to be qualified by the special language of the Federal Water Pollution Control Act, which requires an "opportunity for public hearing" in permit cases.

As I read the court's opinion, their holding on this point was motivated by a concern that all evidence received at an adjudicatory hearing be subject to a full opportunity for public comment and potential cross-examination. The procedures set forth above will provide such an opportunity. I do not believe the court meant totally to exclude the use of written testimony in initial licensing cases such as this.

The examples of abuse of the "written evidence" provision the court gave in its opinion all relate to evidence received *after* the hearing. Here I can appreciate the conclusion that evidence so received may, as a practical matter, be less exposed to public comment than it should be, even if a formal opportunity for cross-examination is provided.

No such danger would arise if the evidence is provided before the hearing and can be the subject of comment, argument, and potential cross-examination at it. In addition, the hearing would provide a chance to correct any unanticipated deficiencies that might arise. Cf. Attorney Generals Manual on the Administrative Procedure Act. p. 78 (1947).

By contrast, there is at least a possibility that an absolute right to present direct testimony orally could be abused for purposes of delay in complicated or controversial cases.

The trend of the law has been to allow more latitude, not less, to agencies to require the submission of complicated technical material in written form to increase efficiency and



avoid delay, as long as an adequate opportunity for public challenge and dispute was preserved. See 40 *Fed. Reg.* 40682, 40703 (Sept. 3, 1975); 41 *Fed. Reg.* 51716-17 (Nov. 23, 1976).

Beyond these considerations, I believe a careful reading of the conceptual framework of the court's opinion also supports the position I have adopted.

The question of the extent to which written evidence is proper under the APA only arises when an initial licensing decision must be made by formal adjudicatory procedures. Those procedures are only applicable where the statute (or in some cases, due process) requires them. The court held that where adjudicatory decisions are concerned, an intent to hold formal hearings should generally be inferred whenever the statute requires a "hearing" in connection with that decision.

However, to hold that written evidence may not be required in initial licensing cases if the governing statute requires a "hearing" would be inconsistent with that basic analysis. The "written evidence" provision only applies when the statute requires a formal hearing. It was deliberately inserted to govern such hearings. To say that it does not apply whenever the statute at issue requires a "hearing" would be in effect to say that it never or almost never applied, since a statutory "hearing" requirement is necessary to make the APA applicable in the first place. It would be in effect to say that the same statutory reference that makes formal hearing procedures applicable generally also makes the "written evidence" provision for initial licensing cases inapplicable, even though Congress expressly inserted that provision as a general rule for formal hearing procedures.

Though the Federal Water Pollution Control Act does not simply require an opportunity for a hearing, but an opportunity for a "public" hearing, I do not believe that the presence or absence of this one word should change the outcome of the analysis. There is no indication Congress intended such a sweeping result to follow, and the term has never been understood to carry this meaning. Indeed, virtually all hearings are "public" by definition and to the extent "public" has any explicit connotation, I take it to be one of less, rather than more, formality — a hearing to receive *public* views and complaints, rather than to generate a record for decision.

Instead, I take the court's opinion to mean that where the statute requires a "public hearing" any written evidence received must come in before that hearing begins, or at it, so that it can be the subject of potential cross-examination, or other types of challenge, in a public forum.

#### *B. Cross-Examination on Supplementary Submissions and Panel Report.*

The court directed me to reconsider whether cross-examination would be useful on the supplemental material which PSCO submitted last year in response to my request. My intention, at the time I denied a hearing on these materials, was also to deny cross-examination because it would be unlikely to serve any useful purpose.

However, as long as additional material that will also be subject to potential cross-examination is being received into the record, I believe I should allow the renewal of any cross-examination requested with respect to the original supplemental material as well, and allow the Presiding Officer to rule on it at the same time that he rules on other cross-examination requests.

Cross-examination of the members of the Technical Review Panel shall be limited to the evidentiary contributions identified by the court and any other evidence the original panel may now elect to contribute. The Panel shall not be cross-examined on any other issues, including the extensive portions of the Report of the Technical Review Panel, as to which the court approved its role.

*D. Final Decision.*

It may be appropriate for me to issue my Decision on Remand in this case without issuing any tentative decision first. The Administrative Procedure Act contemplates that ordinarily a tentative decision will be issued in adjudicatory cases. However, I believe the two previous decisions issued in this case can serve the function of a tentative decision. In addition, the APA recognizes that a tentative decision can be dispensed with in initial licensing in special cases. 5 U.S.C. § 557(b)(2). I believe the extensive prior consideration of this matter, together with the need to bring it to a speedy conclusion, can justify a finding that the requirements of this statutory provision have been met. The Court of Appeals in its opinion appears to have contemplated that I would reach a decision on remand directly, without further intermediate steps. However, I need not decide now whether it is unnecessary to have a tentative decision; I will determine at a later date whether issuance of a tentative decision would be desirable, even in light of the need to reach a speedy decision.

DOUGLAS M. COSTLE  
*Administrator*

Dated: March 20, 1978

RESPONSE PREPARED BY  
THE SEABROOK TECHNICAL PANEL  
TO THE DECISION OF  
THE UNITED STATES COURT OF APPEALS  
FOR THE FIRST CIRCUIT

DR. WILLIAM BRUNGS  
MR. RICHARD CALLAWAY  
DR. ANDREW McERLEAN  
DR. MOSTAFA SHIRAZI  
DR. RICHARD SWARTZ  
DR. BRUCE TICHENOR

April 7, 1978

"B"



We have reviewed the decision of the U.S. Court of Appeals for the First Circuit in *Seacoast Anti-Pollution League, et al. v. Costle* (No. 77-1284), and have identified the four specific instances, where in the opinion of the court, the March 11, 1977, Technical Panel Report was based on information not in the record. The statements referred to by Judge Coffin are contained on pages 19, 13-14, 27, and 30 of the Panel's Report (PR). The following material was prepared by the Technical Panel in response to the court's decision and deals with the specific pages of the Panel's Report highlighted by the court. In order to provide a proper context for the panel's conclusions, in each instance the full question and relevant portions of the answer are provided. The underlined portions are those which appear on pages 17 and 18 of the court's decision.

In preparing the March 11, 1977 Technical Panel Report, we relied on the record and our collective experience in matters relevant to the Seabrook case. A large part of this experience is an understanding of and familiarity with the scientific literature. Several references are discussed below in support of the statements we made in our Report and which were highlighted by the court. These references are provided only as *representative examples* of the body of scientific literature relevant to the specific technical issue being discussed. We emphasize that these examples did not, in and of themselves, provide the total basis for the Panel's statements; they do, however, provide a technical back-up to the statements which concern the court.

# Item 1.

## Panel Report — Page 19

### "IV. Q.

3. Together, the lack of data on species thermal tolerances and the lack of information on numbers of organisms exposed make even an educated guess as to overall direct impact impossible.

### IV. A.

3. Data do exist on the density of benthic, fish, and planktonic communities (PSC 22, PSC 25, PSC 30, PSC 32, and EPA 76).<sup>6</sup> The number of organisms potentially affected can be roughly estimated on the basis of the Alden Research Laboratory study of the spacial distribution of isotherms (EPA 74). See IV. 2. above.

*There is little information in the record on the thermal tolerances of marine organisms exposed to the specific temperature fluctuation associated with the Seabrook operation. However, the scientific literature does contain many references to the thermal sensitivity of members of the local biota. Given the very small area to be impacted with a Delta T greater than 5°F, it seems reasonable to conclude that local indigenous populations will not become unbalanced. Also see IV. I. above."*

## Panel Response to Court Decision

In concluding that local indigenous populations would not become unbalanced because of thermal impacts associated with the Seabrook operation, the Panel relied solely on the record and on its expertise derived from its scientific experiences. As part of the latter, the Panel is familiar

<sup>6</sup> These exhibit numbers refer to exhibits in the original record.

with the literature on thermal effects on biological systems. In stating that the "literature does contain many references to the thermal sensitivity of the local biota," the Panel did not mean to imply that this literature is not cited and discussed in the record. Our intention was simply to state that while little data are available on the "specific temperature fluctuations associated with the Seabrook operation," the thermal sensitivity of many members of the local biota has been studied. The following abstracts are representative examples from the marine biological literature on thermal effects:

1. McLeese (1956) conducted a series of experiments on the effects of temperature on the American lobster (*Homarus americanus*).<sup>7</sup> His experimental design involved acclimating the test organisms to 5, 15, or 25°C and then transferring them to higher temperatures for a 48 hour period. He then calculated the mean tolerance limit (TLm), i.e., the temperature at which 50% of the specimens survived the 48 hour exposure period. The 48 hour TLm for lobsters acclimated at 5°C was 25.7°C, giving a difference (Delta T) between the 5°C acclimation temperature and the TLm of 20.7°C acclimation temperatures were 13.4 and 5.5°C respectively. McLeese's extrapolation value for a 100 minute TLm for lobsters acclimated at 15°C was 30.7°C (Delta T = 15.7°C).

2. Using an experimental design similar to that of McLeese (1956), Hoff and Westman (1966) examined the temperature tolerance of the winter flounder (*Pseudopleuronectes americanus*) and the silverside (*Menidia menidia*). Both of these fishes are found in the Gulf of

<sup>7</sup> For convenience, this and other references are repeated in a table at the end of this report, which table shows the original record exhibit in which the reference is mentioned.

Maine. Hoff and Westman (1966) were able to acclimate both species to temperatures as high as 28°C. The 1 hour TLm values for silversides and flounder acclimated at 7°C were greater than 24 and 23.2°C, respectively. For fishes acclimated at 14°C, the TLm's were 28.4 and 25.5°C for silversides and flounder, respectively. These experiments involved an instantaneous Delta T.

3. Kennedy and Mihursky (1971) examined the thermal tolerances of various molluscs by determining the 24 hour TLm following an instantaneous transfer from acclimation to test temperature. The 24 hour TLm for adult *Mya arenaria* acclimated at 15°C was 30.5°C (Delta T = 15.5°C). The thermal tolerances of young-of-the-year *Mya arenaria*, *Gemma gemma*, *Mulinia lateralis*, *Macoma balthica*, and *Macoma phenax* were all greater than adult *Mya arenaria* in the experiments conducted by Kennedy and Mihursky.

4. Fraenkel (1960) determined the lethal high temperature for the horseshoe crab (*Limulus polyphemus*), the periwinkle (*Littorina littorea*), and the hermit crab (*Pagurus longicarpus*). He exposed the animals to various high temperatures for periods ranging from 7-840 minutes and later determined their condition 24 hours after the exposure period. *Limulus* tolerated 40°C for 14 hours, 42°C for 5 hours, 45°C for 15-20 minutes, and 46°C for 7 minutes. For *Littorina*, the 1 hour TLm was 41°C and the 5.5 hour TLm was 39°C. The 1 hour TLm for *Pagurus* was about 36°C.

5. Brenko and Calabrese (1969) examined the effects of temperature on the survival and growth of straight-hinge larvae of the mussel *Mytilus edulis*. The exposure periods lasted until the fastest growing culture reached setting size (16-17) days. Growth and survival of the



larvae were highest in the cultures maintained at 15 and 20°C. At 25°C, 66.3 and 56.4% of the larvae survived at salinities of 35 and 30‰ respectively. Only 0.3% of the larvae in the 30°C culture survived. Thus, the 16 day TLM for *Mytilus* larvae lies between 25 and 30°C.

#### References Cited

- Brenko, M.H. and A. Calabrese. 1969. The combined effects of salinity and temperature on larvae of the mussel *Mytilus edulis*. Mar. Biol. 4: 224-226.
- Fraenkel, G. 1960. Lethal high temperatures for three marine invertebrates: *Limulus polyphemus*, *Littorina littorea*, and *Pagurus longicarpus*. Oikos 11:171-12.
- Hoff, J.G. and J.R. Westman. 1966. The temperature tolerances of three species of marine fishes. J. Mar. Res. 24: 131-140.
- Kennedy, V.S. and J.A. Mihursky. 1971. Upper temperature tolerances of some estuarine bivalves. Chesapeake Sci. 12: 193-204.
- McLeese, D.W. 1956. Effects of temperature, salinity and oxygen on the survival of the American lobster. J. Fish. Res. Bd. Canada 13: 247-272.

#### Item 2.

#### Panel Report — Pages 13-14

#### "IV. Q.

1. The impact on indigenous populations cannot be reasonably predicted from the evidence in the record (especially considering the potential effects of both intake and discharge) because there is inadequate examination of the effect of the turbulent, heated discharge on planktonic forms, though much attention had been paid to the effect

of the intake in this regard. In particular, the RA found that (a) the data on temperature tolerances of RIS consisted in some cases of studies that did not examine impacts on all necessary life stages; (b) for some RIS little or no relevant data were presented; (c) most of the studies involved gradual temperature increases or exposures after acclimation at temperatures not encountered at Seabrook and are of little relevance to the question of exposure to a quick temperature increase of up to 40°C; (d) some studies cited note lethal temperature limits which are below the maximum temperature of the Seabrook discharge even though these studies generally involved gradual temperature increases; (e) there is little discussion of sublethal effects (such as injury or interference with reproduction cycles) or indirect effects (net increase or decrease in adult stages due to direct lethal or sublethal effect on an earlier life stage of a food or predator species); and (f) neither PSCo nor the Enforcement Division had studied or evaluated the indirect thermal impact on the benthic community including the impact on the pelagic larvae of certain benthic species.

#### IV. A.

1. The Draft 316(a) Technical Guidance — Thermal Discharges (September 30, 1974) discusses the need for thermal effects data for the various life stages of Representative Important Species (RIS) of fish, shellfish, and wildlife. In many situations such data are necessary to determine the effects of the heated effluent on the structure and function of the marine ecosystem. In these situations it would be the responsibility of the Applicant to provide available data and conduct appropriate studies to generate critically needed information.

Analogy and comparison to other power plants in coastal areas does serve to allow estimation of probable effect on

RIS and indigenous populations. Consideration of the Seabrook site is also benefited by a general knowledge of some well-studied and widely-distributed species such as *Mya arenaria* or characteristic zooplankton species assemblages. Thus, while it is true that the applicant did not perform exhaustive studies on all RIS it is not true that nothing is known about these species, their biology, distribution or value to the ecosystem."

#### Panel Response to Court Decision

The following discussion includes examples of scientific references that address the biology, distribution or value to the ecosystem of the winter flounder and the soft-shell clam. Both *Pseudopleuronectes americanus* and *Mya arenaria* have been determined to be Representative Important Species (RIS) at the Seabrook site.

1. Bigelow and Schroeder (1953) described the biology and distribution of *Pseudopleuronectes americanus*; the observation of local races of the species (based on meristic counts), the depth distribution of the flounder and many other factors of its life history, including breeding details and larvae appearance. Additionally, information is given on the commercial importance of this species.

2. Jeffries and Johnson (1974) employed weekly sampling to determine the seasonality and relative abundance of *Pseudopleuronectes americanus* and other species. The flounder dominated (numerically) the total catch in both Narragansett Bay and in Rhode Island Sound. Their study suggested that abundance is related to climatic phenomena rather than to harvest or fishing pressure. Catch was negatively but significantly correlated with temperature over the seven-year study period.

3. Frame (1973) examined the food conversion efficiency of one year-old flounder held at various salinities

and temperatures in the laboratory. Although the number of experimental animals was small, higher temperatures generally resulted in lower growth rates. Salinity did not appear to affect food conversion ability.

4. Ayers (1956) discussed the population dynamics of the soft-shell clam in the New England area and especially the relationship of larval density and survival to adult standing stocks. Kennedy and Mihursky (1971) described the temperature tolerance of *Mya* in the Chesapeake Bay area (see above). Porter (1974) examined the reproductive cycle and gonadal histology of the soft-clam in Skagit Bay, Washington.

#### References Cited

- Ayers, J.C. 1956. Population dynamics of the marine clam, *Mya arenaria*. Limnol. Oceanogr. 1: 26-34.
- Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. Fish. Bull. 74. vol. 53: 276-283.
- Frame, D.W. 1973. Conversion efficiency and survival of young winter flounder under experimental conditions. Trans. Amer. Fish. Soc. 3: 614-617.
- Jeffries, H.P. and W.C. Johnson. 1974. Seasonal distribution of bottom fishes in the Narragansett Bay area: Seven year variations in the abundance of winter flounder. Fish. Res. Bd. Canada 31: 1057-1066.
- Kennedy, V.S. and J.A. Mihursky. 1971. Upper temperature tolerances of some estuarine bivalves. Chesapeake Sci. 12: 193-204.
- Porter, R.G. 1974. Reproductive cycle of the soft-shell clam, *Mya arenaria*, at Skagit, Washington. Fish. Bull. 72: 648-656.



**Item 3.****Panel Report — Page 27****"IV. Q.**

8. There was no evidence as to whether there will be any impact on wildlife, such as birds.

**IV. A.**

8. *We concur with the conclusion of the Regional Administrator (RA's I.D. p. 55) that there was no evidence on the question of whether there will be any impact on wildlife, such as birds. The second statement to which he refers (PSC 28, P. 110) simply stated that plankton biomass is being converted to biomass of fish, birds, or benthic invertebrates. Since we conclude that holoplankton entrained or subjected to the turbulent heated discharge (zoo- and phytoplankton) are not likely to be adversely affected, it is unlikely that there would be any conceivable impact at the top of the food chain."*

**Panel Response to Court Decision**

The panel applied a basic ecological principle of energy flow between trophic levels when it concluded that the absence of a significant adverse impact on holoplankton would preclude an impact on higher trophic levels. Odum (1971) presented an extensive and lucid discussion on energy flow and stability. If the holoplankton community remains stable in the presence of the Seabrook operation (as concluded by the Panel and the Regional Administrator, PR p. 32), then it will continue to provide a natural flow of energy to higher trophic levels, including birds and other wildlife. In effect, we concluded that while the question of impact on wildlife had not been addressed,

there was nothing in the record or in our understanding of the ecological principles involved that suggested that such impacts needed to be considered.

**Reference Cited**

Odum, E.P. 1971. *Fundamentals of Ecology*, 3rd Edition, W.B. Saunders Co., Philadelphia, 574 pp.

**Item 4.****Panel Report — Page 30****"IV. Q.**

10. Even if the effects of the intake alone (entrainment and entrapment) were considered, the impact on many species populations was unknown and could be significant. Specifically, there was inadequate information on actual migratory pathways in and out of Hampton Harbor, and little evidence of the actual overall abundance of the finfish species in the area potentially impacted. This inadequacy of information exists for both the near site and the far site.

**IV. A.**

10. *We agree that only limited data exist on the migratory pathways of fish to and from Hampton Harbor and also that entrapment of fishes may occur. Nevertheless there have been substantial studies performed on fish migratory behavior; some of these have been done at power plant sites. Generally, these studies suggest that fish do not migrate consistently over time within a narrow range (path) through a waterbody. Over time their movements are relatively diffuse in situations where there are not discrete physiographic characteristics to which they might associate or orient. Since no such characteristics occur*

near the proposed offshore intake location, we would not expect substantial entrapment at the site nor would we expect the disruption of migratory movements."

#### Panel Response to Court Decision

The following materials summarize various studies on the movement or migration of finfishes and are examples of the scientific literature concerning fish movement:

1. Howe and Coates (1975) reported the results of an extensive winter flounder (*Pseudopleuronectes americanus*) tagging program off Massachusetts. Their study indicates that migratory movements are very diffuse. Following spawning in the shoal water of Boston Harbor, "spent fish dispersed and wandered, relocating to deeper water near the Harbor mouth by midsummer." Flounder released in Vineyard Sound and the westernmost shoals of Nantucket Sound dispersed offshore and southeast during spring and summer. Fish leaving the same bay did not migrate in the same direction. On Georges Bank, flounder appeared to "randomly disperse" during the spring.

2. Bigelow and Schroeder (1953) discussed numerous aspects of the life history and movements of fishes of the Gulf of Maine. They stated that the menhaden (*Brevoortia tyrannus*) appearances and disappearances in the Gulf of Maine are the result of a migration from the south around Cape Cod in the spring and a return journey in the autumn and that this migration is related to temperature. The smelt (*Osmerus mordax*) is an inshore fish, confined to a zone along the coast, and none has been reported more than a mile or so from the land, or more than two or three fathoms in depth, while many spend the whole year in estuarine situations. The pollock (*Pollachius virens*) is an active fish, living at any level between the bottom and

surface, according to the food supply and season. The very young pollock tend to move with the prevailing currents and the larger pollock wander little and tend to be stationary. The winter flounder (*Pseudopleuronectes americanus*) population consists of independent localized stocks inhabiting the bays and estuaries along the coast with the fish merely tending to scatter. The mackerel (*Scomber scombrus*) is a fish of the open seas, while numbers of them, small ones especially, often enter harbors and estuaries in search of food. They are not directly dependent either on the coastline or on the bottom at any stage in their lives.

3. Nakatani (1969) reported on studies of fish migration in the Columbia River as affected by the addition of heated water from the Hanford reactors. The data indicated that the salmon migrating through this area were not limited to the cooler wedge of water along the shore opposite the reactors. This implied that the migration routes were influenced by more than water temperature, possibly velocity. The author cited a report in which the seaward migration of young salmon was studied. These fish demonstrated a preference for shallow water near the banks of the Columbia River. Related studies at Hanford observed two waves of downstream migration between March and late July during a period of rising river temperatures.

4. McCracken (1963) concluded that winter flounder movement or distribution is controlled by temperature. For example, in the Long Island Region, their offshore movement was shown to be a gradual dispersal with flounders leaving warmer inner bays first, but remaining within the cooler portions at quite similar depths much longer.



5. Sette (1950) described and summarized the migration and habits of the Atlantic mackerel (*Scomber scombrus*). The southern contingent, or population, first appears in the spring in the surface waters overlying the continental shelf 30 to 50 miles offshore. They soon come closer inshore, occupying the inner third or half of the continental shelf which is about 50 miles broad at Delaware Bay. From here they move northward and are joined by additional schools moving in from the edge of the continental shelf in wavelike incursions. The fall migrations of this population and the northern population simply reverse their approach in the spring.

6. Young (1974) discussed the concern for menhaden as affected by power plants. He concluded that the migration of juveniles to sea is generally triggered when the water temperature begins to drop in the late summer and fall. The migration is not always complete, however, since some individuals remain to overwinter. The migrating menhaden move southward to offshore wintering areas.

#### References Cited

- Bigelow, H.B. and W.C. Schroeder. 1953. Fishes of the Gulf of Maine. Fish. Bull. 74. Vol. 53: 113-118, 135-139, 213-221, 276-283, 317-333.
- Howe, A.B. and P.G. Coates. 1975. Winter flounder movements, growth, and mortality off Massachusetts. Trans. Amer. Fish. Soc. 104: 13-29.
- McCracken, F.D. 1963. Seasonal movements of the winter flounder *Pseudopleuronectes americanus* (Walbaum) on the Atlantic Coast. Fish. Res. Bd. Canada 20:551-586.

Nakatani, R.E. 1969. Effects of heated discharges on anadromous fishes. In: *Biological Aspects of Thermal Pollution*. Edited by Peter A. Krenkel and Frank L. Parker, Vanderbilt University Press, 294-317.

Sette, O.E. 1950. Biology of the Atlantic mackerel (*Scomber scombrus*) of North America. Part II-Migrations and Habits. Fish. Bull. 49: 269.

Young, J.D. 1974. Menhaden and power plants: a growing concern. Mar. Fish. Rev. 36: 19-23.

Reference	Original Record Exhibit
Brenko and Calabrese (1969)	EPA 48, PSC 14
Kennedy and Mihursky (1971)	EPA 48
Hoff and Westman (1966)	EPA 48
McLeese (1956)	PSC 14, EPA 48, EPA 40
Fraenkel (1960)	PSC 14
Ayers (1956)	PSC 28, EPA 40
Bigelow and Schroeder (1953)	PSC 21, EPA 37, PSC 32, PSC 28, PSC 27, EPA 48
Frame (1973)	EPA 48, PSC 32, PSC 27
Jeffries and Johnson (1974)	PSC 32, PSC 28
Porter (1974)	PSC 16, PSC 29, PSC 35
Howe and Coates (1975)	PSC 27, PSC 32
Nakatani (1969)	PSC 14
Sette (1950)	PSC 27
Young (1974)	EPA 37
McCracken (1963)	PSC 27
Odum (1971)	Not Cited

UNITED STATES COURT OF APPEALS  
FOR THE FIRST CIRCUIT

No. 77-1284.

SEACOAST ANTI-POLLUTION LEAGUE  
AND AUDUBON SOCIETY OF NEW HAMPSHIRE,  
*Petitioners,*

v.

DOUGLAS M. COSTLE AS ADMINISTRATOR  
OF THE ENVIRONMENTAL PROTECTION AGENCY,  
*Respondent,*

PUBLIC SERVICE COMPANY OF  
NEW HAMPSHIRE ET AL.,  
*Intervenors.*

ORDER OF COURT

Entered April 21, 1978

The motion of intervenor Public Service Company of New Hampshire, for leave to file a petition for rehearing out of time, etc., is granted and the petition is denied.

By the Court:

DANA H. GALLUP, *Clerk*

By /s/ FRANCIS P. SCIGLIANO  
*Chief Deputy Clerk*

STATUTES AND REGULATIONS INVOLVED  
ADMINISTRATIVE PROCEDURE ACT

Section 4, 5 U.S.C. § 553

(a) This section applies, according to the provisions thereof, except to the extent that there is involved —

(1) a military or foreign affairs function of the United States; or

(2) a matter relating to agency management or personnel or to public property, loans, grants, benefits, or contracts.

(b) General notice of proposed rule making shall be published in the Federal Register, unless persons subject thereto are named and either personally served or otherwise have actual notice thereof in accordance with law. The notice shall include —

(1) a statement of the time, place, and nature of public rule making proceedings;

(2) reference to the legal authority under which the rule is proposed; and

(3) either the terms or substance of the proposed rule or a description of the subjects and issues involved.

Except when notice or hearing is required by statute, this subsection does not apply —

(A) to interpretative rules, general statements of policy, or rules of agency organization, procedure, or practice; or

(B) when the agency for good cause finds (and incorporates the finding and a brief statement of reasons therefor in the rules issued) that notice and public procedure thereon are impracticable, unnecessary, or contrary to the public interest.



(c) After notice required by this section, the agency shall give interested persons an opportunity to participate in the rule making through submission of written data, views, or arguments with or without opportunity for oral presentation. After consideration of the relevant matter presented, the agency shall incorporate in the rules adopted a concise general statement of their basis and purpose. When rules are required by statute to be made on the record after opportunity for an agency hearing, sections 556 and 557 of this title apply instead of this subsection.

(d) The required publication or service of a substantive rule shall be made not less than 30 days before its effective date, except—

- (1) a substantive rule which grants or recognizes an exemption or relieves a restriction;
- (2) interpretative rules and statements of policy; or
- (3) as otherwise provided by the agency for good cause found and published with the rule.

(e) Each agency shall give an interested person the right to petition for the issuance, amendment, or repeal of a rule.

#### Section 5, 5 U.S.C. § 554

(a) This section applies, according to the provisions thereof, in every case of adjudication required by statute to be determined on the record after opportunity for an agency hearing, except to the extent that there is involved —

- (1) a matter subject to a subsequent trial of the law and the facts de novo in a court;

(2) the selection or tenure of an employee, except a hearing examiner appointed under section 3105 of this title;

(3) proceedings in which decisions rest solely on inspections, tests, or elections;

(4) the conduct of military or foreign affairs functions;

(5) cases in which an agency is acting as an agent for a court; or

(6) the certification of worker representatives.

(b) Persons entitled to notice of an agency hearing shall be timely informed of —

- (1) the time, place, and nature of the hearing;
- (2) the legal authority and jurisdiction under which the hearing is to be held; and
- (3) the matters of fact and law asserted.

When private persons are the moving parties, other parties to the proceeding shall give prompt notice of issues controverted in fact or law; and in other instances agencies may by rule require responsive pleading. In fixing the time and place for hearings, due regard shall be had for the convenience and necessity of the parties or their representatives.

(c) The agency shall give all interested parties opportunity for —

- (1) the submission and consideration of facts, arguments, offers of settlement, or proposals of adjustment when time, the nature of the proceeding, and the public interest permit; and

(2) to the extent that the parties are unable so to determine a controversy by consent, hearing and decision on notice and in accordance with sections 556 and 557 of this title.

(d) The employee who presides at the reception of evidence pursuant to section 556 of this title shall make the recommended decision or initial decision required by section 557 of this title, unless he becomes unavailable to the agency. Except to the extent required for the disposition of ex parte matters as authorized by law, such an employee may not —

(1) consult a person or party on a fact in issue, unless on notice and opportunity for all parties to participate; or

(2) be responsible to or subject to the supervision or direction of an employee or agent engaged in the performance of investigative or prosecuting functions for an agency.

An employee or agent engaged in the performance of investigative or prosecuting functions for an agency in a case may not, in that or a factually related case, participate or advise in the decision, recommended decision, or agency review pursuant to section 557 of this title, except as witness or counsel in public proceedings. This subsection does not apply —

(A) in determining applications for initial licenses;

(B) to proceedings involving the validity or application of rates, facilities, or practices of public utilities or carriers; or

(C) to the agency or a member or members of the body comprising the agency.

(e) The agency, with like effect as in the case of other orders, and in its sound discretion, may issue a declaratory order to terminate a controversy or remove uncertainty.

#### Section 7, 5 U.S.C. § 556

(a) This section applies, according the provisions thereof, to hearings required by section 553 or 554 of this title to be conducted in accordance with this section.

(b) There shall preside at the taking of evidence —

(1) the agency;

(2) one or more members of the body which comprises the agency; or

(3) one or more hearing examiners appointed under section 3105 of this title.

This subchapter does not supersede the conduct of specified classes of proceedings, in whole or in part, by or before boards or other employees specially provided for by or designated under statute. The functions of presiding employees and of employees participating in decisions in accordance with section 557 of this title shall be conducted in an impartial manner. A presiding or participating employee may at any time disqualify himself. On the filing in good faith of a timely and sufficient affidavit of personal bias or other disqualification of a presiding or participating employee, the agency shall determine the matter as a part of the record and decision in the case.

(c) Subject to published rules of the agency and within its powers, employees presiding at hearings may —

(1) administer oaths and affirmations;

(2) issue subpoenas authorized by law;



(3) rule on offers of proof and receive relevant evidence;

(4) take depositions or have depositions taken when the ends of justice would be served;

(5) regulate the course of the hearing;

(6) hold conferences for the settlement or simplification of the issues by consent of the parties;

(7) dispose of procedural requests or similar matters;

(8) make or recommend decisions in accordance with section 557 of this title; and

(9) take other action authorized by agency rule consistent with this subchapter.

(d) Except as otherwise provided by statute, the proponent of a rule or order has the burden of proof. Any oral or documentary evidence may be received, but the agency as a matter of policy shall provide for the exclusion of irrelevant, immaterial, or unduly repetitious evidence. A sanction may not be imposed or rule or order issued except on consideration of the whole record or those parts thereof cited by a party and supported by and in accordance with the reliable, probative, and substantial evidence. The agency may, to the extent consistent with the interests of justice and the policy of the underlying statutes administered by the agency, consider a violation of section 557(d) of this title sufficient grounds for a decision adverse to a party who has knowingly committed such violation or knowingly caused such violation to occur. A party is entitled to present his case or defense by oral or documentary evidence, to submit rebuttal evidence, and to conduct such cross-examination as may be required for a full and true disclosure of the facts. In rule making or determining claims for money or benefits or applications for initial li-

censes an agency may, when a party will not be prejudiced thereby, adopt procedures for the submission of all or part of the evidence in written form.

(e) The transcript of testimony and exhibits, together with all papers and requests filed in the proceeding, constitutes the exclusive record for decision in accordance with section 557 of this title and, on payment of lawfully prescribed costs, shall be made available to the parties. When an agency decision rests on official notice of a material fact not appearing in the evidence in the record, a party is entitled, on timely request, to an opportunity to show the contrary.

#### Section 8, 5 U.S.C. § 557

(a) This section applies, according to the provisions thereof, when a hearing is required to be conducted in accordance with section 556 of this title.

(b) When the agency did not preside at the reception of the evidence, the presiding employee or, in cases not subject to section 554(d) of this title, an employee qualified to preside at hearings pursuant to section 556 of this title, shall initially decide the case unless the agency requires, either in specific cases or by general rule, the entire record to be certified to it for decision. When the presiding employee makes an initial decision, that decision then becomes the decision of the agency without further proceedings unless there is an appeal to, or review on motion of, the agency within time provided by rule. On appeal from or review of the initial decision, the agency has all the powers which it would have in making the initial decision except as it may limit the issues on notice or by rule. When the agency makes the decision without having presided at the reception of the evidence, the presiding employee or an em-

ployee qualified to preside at hearings pursuant to section 556 of this title shall first recommend a decision, except that in rule making or determining applications for initial licenses —

(1) instead thereof the agency may issue a tentative decision or one of its responsible employees may recommend a decision; or

(2) this procedure may be omitted in a case in which the agency finds on the record that due and timely execution of its functions imperatively and unavoidably so requires.

(c) Before a recommended, initial, or tentative decision, or a decision on agency review of the decision of subordinate employees, the parties are entitled to a reasonable opportunity to submit for the consideration of the employees participating in the decisions —

(1) proposed findings and conclusions; or

(2) exceptions to the decisions or recommended decisions of subordinate employees or to tentative agency decisions; and

(3) supporting reasons for the exceptions or proposed findings or conclusions.

The record shall show the ruling on each finding, conclusion, or exception presented. All decisions, including initial, recommended, and tentative decisions, are a part of the record and shall include a statement of —

(A) findings and conclusions, and the reasons or basis therefor, on all the material issues of fact, law, or discretion presented on the record; and

(B) the appropriate rule, order, sanction, relief, or denial thereof.

(d)(1) In any agency proceeding which is subject to subsection (a) of this section, except to the extent required for the disposition of ex parte matters as authorized by law —

(A) no interested person outside the agency shall make or knowingly cause to be made to any member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of the proceeding, an ex parte communication relevant to the merits of the proceeding;

(B) no member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of the proceeding, shall make or knowingly cause to be made to any interested person outside the agency an ex parte communication relevant to the merits of the proceeding;

(C) a member of the body comprising the agency, administrative law judge, or other employee who is or may reasonably be expected to be involved in the decisional process of such proceeding who receives, or who makes or knowingly causes to be made, a communication prohibited by this subsection shall place on the public record of the proceeding:

(i) all such written communications;

(ii) memoranda stating the substance of all such oral communications; and

(iii) all written responses, and memoranda stating the substance of all oral responses, to the materials described in clauses (i) and (ii) of this subparagraph;

(D) upon receipt of a communication knowingly made or knowingly caused to be made by a party in violation



of this subsection, the agency, administrative law judge, or other employee presiding at the hearing may, to the extent consistent with the interests of justice and the policy of the underlying statutes, require the party to show cause why his claim or interest in the proceeding should not be dismissed, denied, disregarded, or otherwise adversely affected on account of such violation; and

(E) the prohibitions of this subsection shall apply beginning at such time as the agency may designate, but in no case shall they begin to apply later than the time at which a proceeding is noticed for hearing unless the person responsible for the communication has knowledge that it will be noticed, in which case the prohibitions shall apply beginning at the time of his acquisition of such knowledge.

(2) This subsection does not constitute authority to withhold information from Congress.

# **FEDERAL WATER POLLUTION CONTROL ACT, AMENDMENT OF 1972**

## **Section 316, 33 U.S.C. § 1326**

“(a) With respect to any point source otherwise subject to the provisions of section 301 or section 306 of this Act, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water into which the discharge

is to be made, the Administrator (or, if appropriate, the State) may impose an effluent limitation under such sections for such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of water.

“(b) Any standard established pursuant to section 301 or section 306 of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact.

“(c) Notwithstanding any other provision of this Act, any point source of a discharge having a thermal component, the modification of which point source is commenced after the date of enactment of the Federal Water Pollution Control Act Amendments of 1972 and which, as modified, meets effluent limitations established under section 301 or, if more stringent, effluent limitations established under section 303 and which effluent limitations will assure protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in or on the water into which the discharge is made, shall not be subject to any more stringent effluent limitation with respect to the thermal component of its discharge during a ten year period beginning on the date of completion of such modification or during the period of depreciation or amortization of such facility for the purpose of section 167 or 169 (or both) of the Internal Revenue Code of 1954, whichever period ends first.

## Section 402, 33 U.S.C. § 1342

(a)(1) Except as provided in sections 318 and 404 of this Act, the Administrator may, after opportunity for public hearing, issue a permit for the discharge of any pollutant, or combination of pollutants, notwithstanding section 301(a), upon condition that such discharge will meet either all applicable requirements under sections 301, 302, 306, 307, 308, and 403 of this Act, or prior to the taking of necessary implementing actions relating to all such requirements, such conditions as the Administrator determines are necessary to carry out the provisions of this Act.

"(2) The Administrator shall prescribe conditions for such permits to assure compliance with the requirements of paragraph (1) of this subsection, including conditions on data and information collection, reporting, and such other requirements as he deems appropriate.

"(3) The permit program of the Administrator under paragraph (1) of this subsection, and permits issued thereunder, shall be subject to the same terms, conditions, and requirements as apply to a State permit program and permits issued thereunder under subsection (b) of this section.

"(4) All permits for discharges into the navigable waters issued pursuant to section 13 of the Act of March 3, 1899, shall be deemed to be permits issued under this title, and permits issued under this title shall be deemed to be permits issued under section 13 of the Act of March 3, 1899, and shall continue in force and effect for their term unless revoked, modified, or suspended in accordance with the provisions of this Act.

"(5) No permit for a discharge into the navigable waters shall be issued under section 13 of the Act of March 3, 1899, after the date of enactment of this title. Each appli-

cation for a permit under section 13 of the Act of March 3, 1899, pending on the date of enactment of this Act shall be deemed to be an application for a permit under this section. The Administrator shall authorize a State, which he determines has the capability of administering a permit program which will carry out the objective of this Act, to issue permits for discharges into the navigable waters within the jurisdiction of such State. The Administrator may exercise the authority granted him by the preceding sentence only during the period which begins on the date of enactment of this Act and ends either on the ninetieth day after the date of the first promulgation of guidelines required by section 304(h)(2) of this Act, or the date of approval by the Administrator of a permit program for such State under subsection (b) of this section, whichever date first occurs, and no such authorization to a State shall extend beyond the last day of such period. Each such permit shall be subject to such conditions as the Administrator determines are necessary to carry out the provisions of this Act. No such permit shall issue if the Administrator objects to such issuance.

"(b) At any time after the promulgation of the guidelines required by subsection (h)(2) of section 304 of this Act, the Governor of each State desiring to administer its own permit program for discharges into navigable waters within its jurisdiction may submit to the Administrator a full and complete description of the program it proposes to establish and administer under State law or under an interstate compact. In addition, such State shall submit a statement from the attorney general (or the attorney for those State water pollution control agencies which have independent legal counsel), or from the chief legal officer in the case of an interstate agency, that the laws of such State, or the interstate compact, as the case may be, pro-



vide adequate authority to carry out the described program. The Administrator shall approve each such submitted program unless he determines that adequate authority does not exist:

"(1) To issue permits which —

"(A) apply, and insure compliance with, any applicable requirements of sections 301, 302, 306, 307, and 403;

"(B) are for fixed terms not exceeding five years; and

"(C) can be terminated or modified for cause including, but not limited to, the following:

"(i) violation of any condition of the permit;

"(ii) obtaining a permit by misrepresentation, or failure to disclose fully all relevant facts;

"(iii) change in any condition that requires either a temporary or permanent reduction or elimination of the permitted discharge;

"(D) control the disposal of pollutants into wells;

"(2) (A) To issue permits which apply, and insure compliance with, all applicable requirements of section 308 of this Act, or

"(B) To inspect, monitor, enter, and require reports to at least the same extent as required in section 308 of this Act;

"(3) To insure that the public, and any other State the waters of which may be affected, receive notice of each application for a permit and to provide an opportunity for public hearing before a ruling on each such application;

"(4) To insure that the Administrator receives notice of each application (including a copy thereof) for a permit;

"(5) To insure that any State (other than the permitting State), whose waters may be affected by the issuance of a

permit may submit written recommendations to the permitting State (and the Administrator) with respect to any permit application and, if any part of such written recommendations are not accepted by the permitting State, that the permitting State will notify such affected State (and the Administrator) in writing of its failure to so accept such recommendations together with its reasons for so doing;

"(6) To insure that no permit will be issued if, in the judgment of the Secretary of the Army acting through the Chief of Engineers, after consultation with the Secretary of the department in which the Coast Guard is operating, anchorage and navigation of any of the navigable waters would be substantially impaired thereby;

"(7) To abate violations of the permit or the permit program, including civil and criminal penalties and other ways and means of enforcement;

"(8) To insure that any permit for a discharge from a publicly owned treatment works includes conditions to require adequate notice to the permitting agency of (A) new introductions into such works of pollutants from any source which would be a new source as defined in section 306 if such source were discharging pollutants, (B) new introductions of pollutants into such works from a source which would be subject to section 301 if it were discharging such pollutants, or (C) a substantial change in volume or character of pollutants being introduced into such works by a source introducing pollutants into such works at the time of issuance of the permit. Such notice shall include information on the quality and quantity of effluent to be introduced into such treatment works and any anticipated impact of such change in the quantity or quality of effluent

to be discharged from such publicly owned treatment works; and

"(9) To insure that any industrial user of any publicly owned treatment works will comply with sections 204(b), 307, and 308.

"(c)(1) Not later than ninety days after the date on which a State has submitted a program (or revision thereof) pursuant to subsection (b) of this section, the Administrator shall suspend the issuance of permits under subsection (a) of this section as to those navigable waters subject to such program unless he determines that the State permit program does not meet the requirements of subsection (b) of this section or does not conform to the guidelines issued under section 304(h)(2) of this Act. If the Administrator so determines, he shall notify the State of any revisions or modifications necessary to conform to such requirements or guidelines.

"(2) Any State permit program under this section shall at all times be in accordance with this section and guidelines promulgated pursuant to section 304(h)(2) of this Act.

"(3) Whenever the Administrator determines after public hearing that a State is not administering a program approved under this section in accordance with requirements of this section, he shall so notify the State and, if appropriate corrective action is not taken within a reasonable time, not to exceed ninety days, the Administrator shall withdraw approval of such program. The Administrator shall not withdraw approval of any such program unless he shall first have notified the State, and made public, in writing, the reasons for such withdrawal.

"(d)(1) Each State shall transmit to the Administrator a copy of each permit application received by such State

and provide notice to the Administrator of every action related to the consideration of such permit application, including each permit proposed to be issued by such State.

"(2) No permit shall issue (A) if the Administrator within ninety days of the date of his notification under subsection (b)(5) of this section objects in writing to the issuance of such permit, or (B) if the Administrator within ninety days of the date of transmittal of the proposed permit by the State objects in writing to the issuance of such permit as being outside the guidelines and requirements of this Act.

"(3) The Administrator may, as to any permit application, waive paragraph (2) of this subsection.

"(e) In accordance with guidelines promulgated pursuant to subsection (h)(2) of section 304 of this Act, the Administrator is authorized to waive the requirements of subsection (d) of this section at the time he approves a program pursuant to subsection (b) of this section for any category (including any class, type, or size within such category) of point sources within the State submitting such program.

"(f) The Administrator shall promulgate regulations establishing categories of point sources which he determines shall not be subject to the requirements of subsection (d) of this section in any State with a program approved pursuant to subsection (b) of this section. The Administrator may distinguish among classes, types, and sizes within any category of point sources.

"(g) Any permit issued under this section for the discharge of pollutants into the navigable waters from a vessel or other floating craft shall be subject to any applicable regulations promulgated by the Secretary of the depart-



ment in which the Coast Guard is operating, establishing specifications for safe transportation, handling, carriage, storage, and stowage of pollutants.

“(h) In the event any condition of a permit for discharges from a treatment works (as defined in section 212 of this Act) which is publicly owned is violated, a State with a program approved under subsection (b) of this section or the Administrator, where no State program is approved, may proceed in a court of competent jurisdiction to restrict or prohibit the introduction of any pollutant into such treatment works by a source not utilizing such treatment works prior to the finding that such condition was violated.

“(i) Nothing in this section shall be construed to limit the authority of the Administrator to take action pursuant to section 309 of this Act.

“(j) A copy of each permit application and each permit issued under this section shall be available to the public. Such permit application or permit, or portion thereof, shall further be available on request for the purpose of reproduction.

“(k) Compliance with a permit issued pursuant to this section shall be deemed compliance, for purposes of sections 309 and 505, with sections 301, 302, 306, 307, and 403, except any standard imposed under section 307 for a toxic pollutant injurious to human health. Until December 31, 1974, in any case where a permit for discharge has been applied for pursuant to this section, but final administrative disposition of such application has not been made, such discharge shall not be a violation of (1) section 301, 306, or 402 of this Act, or (2) section 13 of the Act of March 3, 1899, unless the Administrator or other plaintiff proves that final administrative disposition of such application has

not been made because of the failure of the applicant to furnish information reasonably required or requested in order to process the application. For the 180-day period beginning on the date of enactment of the Federal Water Pollution Control Act Amendments of 1972, in the case of any point source discharging any pollutant or combination of pollutants immediately prior to such date of enactment which source is not subject to section 13 of the Act of March 3, 1899, the discharge by such source shall not be a violation of this Act if such a source applies for a permit for discharge pursuant to this section within such 180-day period.

#### 40 C.F.R. § 125.36(n) (12)

(12) The Administrator shall decide the matters under review on the basis of the record presented and any other consideration he deems relevant. Oral argument before the Administrator will be available only where the Administrator, in his discretion, requests such argument.